

Quality Electrostatic Precipitator Technology, Parts and Service

Optimizing the Performance of Particulate Matter Control



Get the most from your current ESP system



Aging technology and lack of support from some original equipment manufacturers and aftermarket suppliers has resulted in lost productivity and reduced efficiency for many electrostatic precipitator (ESP) systems. ESP products and services provided by Babcock & Wilcox (B&W) are designed with one goal in mind—to help keep your ESP functioning at peak performance. Our vast worldwide industry experience, which includes technology formerly offered by Joy Western Precipitation, BHA, GE Energy and Rothemühle, enables us to provide integrated solutions to enhance equipment performance, regardless of original manufacturer. We provide engineered upgrades, quality components, services and construction to help keep your ESP running efficiently and effectively. Our combination of innovative, cost-effective products and services include:

- Unitized and strip collecting plates
- Wire, rigid frame and rigid discharge electrodes
- Rapper and rapper components
- Insulators
- Access doors and door seals
- Purge air systems
- Single and 3-phase power supplies and automatic voltage controls
- Rapper controls
- Electrical performance enhancement hardware and software
- 24/7 remote diagnostics
- Upgrades, rebuilds, construction, re-powering and conversions
- Field services
- In-house or on-site operating and maintenance training seminars that can be tailored to your industry and equipment



Technology and Innovation

Passionate about innovation and technology leadership, B&W's experienced team of experts develop electrical, mechanical and controls/software innovations, which lead to new products and solutions. Research and development is performed using modeling software, an in-house test ESP and full-scale field tests/experiments. Historical developments have included a unique strip collecting plate, automatic voltage controls (AVCs), programmable rapper controls, continuous particulate monitors, and purge air controls, just to name a few.

Through continued improvement and expansion of existing technologies, we are constantly developing new solutions to meet your particulate control needs.

Total Package Solutions

B&W is the manufacturer of products formerly offered by Joy Western Precipitation, BHA Group, Inc., GE Energy and the Rothemühle ESP design. We provide a total package of OEM and aftermarket products and services designed to reduce operating and maintenance costs, improve reliability and safety, and enhance overall performance and efficiency, regardless of manufacturer. Our experience includes a wide range of industries and applications.

Capabilities

- Engineered equipment upgrades
- Start-up and commissioning
- Construction
- Performance testing and monitoring
- Equipment tuning and optimization
- Remote diagnostic services
- Field service engineering
- Replacement parts

Industries/Applications

- Power utilities
- Petrochemical – fluid catalytic cracking units
- Pulp & paper – recovery boiler, power boiler, lime kiln
- Steel – basic oxygen furnace, power boilers
- Cement – cement kilns, lime kilns, gypsum kettles
- Metals/Minerals – smelters, roasters, flash converters, acid plant
- Wood products – biomass boilers
- Waste to energy





Engineered Upgrades and

Original equipment manufacturer (OEM) upgrades

To address design deficiencies and increased maintenance of original equipment, **B&W can upgrade virtually any existing ESP**, regardless of original manufacturer. For example:

Buell-type ESPs

B&W can provide upgrades specific to Buell-type ESPs. Upgrades include:

- Collecting and high-voltage rapper shaft design upgrades and boot seal upgrades to prevent rapper/vibrator shaft corrosion, as well as correcting binding issues
- Elkhorn adapters for easier wire replacement and to help prevent spit arcing and wire shroud damage
- Lower panel guide (B-Line) modifications to relieve plate bowing; allows plates to expand vertically, and improves rapping effectiveness
- Heavier, stronger replacement weight hooks to reduce mechanical fatigue and arcing
- Replacement discharge electrodes with solid shrouds in a variety of materials and configurations
- Patented ESP-3 collecting plates for long life, durability and bow resistance; later adapted to other ESP designs
- Replacement plate support bolts to stop in-leakage

Joy Western ESPs

As the legacy OEM for Joy Western ESPs, B&W offers a wide range of upgrades and replacement parts for all Joy ESPs. Upgrades include:

- Collecting plates and discharge electrodes
- Stabilized discharge electrode frames to stop wire oscillation problems
- Top hat seals to stop in-leakage at support points and reduce the quantity of purge air required
- Weight upgrades and improved anti-sway bars that eliminate destabilization
- Plate straightening devices for M-Channel and RUCC plates resulting in increased electrical clearance and improved performance

ESP rebuilds

B&W provides innovative ESP rebuild solutions around the world. Backed by decades of experience, we develop a customized rebuild plan using information gathered by analyzing and assessing ESP operation and physical equipment and comparing it to production requirements and emissions reduction goals. Rebuilds can include replacement of structural mechanical components and/or electrical components and controls, all backed by a dedicated support team of engineers and technicians.

Services



New ESP construction, or total or partial ESP rebuilds are recommended when faced with the following conditions:

- Process or fuel changes
- Excessive collecting plate or discharge electrode deterioration
- Damage due to fire or explosion
- Inadequate collection efficiency
- Excessive maintenance costs
- New regulatory requirements

Rigid discharge electrode technology

To improve ESP performance and availability, B&W can rebuild weighted-wire or rigid frame-type ESPs with a more reliable rigid discharge electrode (RDE). Our quality RDEs are custom manufactured, with options for pin spacing, pin configuration and materials. We consider your process

and transformer/rectifier (T/R) ratings, and can provide discharge electrodes of varying configurations to maximize power input in each ESP field. B&W RDE advantages include:

- Low corona onset voltage to combat particulate "space charge"
- Robust RDEs, eliminating broken wires that can ground out one or multiple fields
- No weights to fall into hoppers and damage conveyors
- No need to stock replacement wires or weights
- More easily cleaned than wires, enhancing performance
- One RDE replaces two wires and weights
- Sparking has little damaging effect on RDEs
- Customized RDE pin configuration to give the best performance in each field

Plate height extension and rapper re-sectionalization

Plate height extensions yield more collecting surface area without increasing the footprint of the ESP. These wall extension frames are built on the ground with large intermediate roof beams pre-fabricated in the shop to minimize field labor and outage time. Re-sectionalizing the rappers can reduce re-entrainment of dust and increase the rapping energy to the collecting plate.



ESP Rebuilds, Upgrades and Optimization Services

■ Service Capabilities

Mechanical and electrical inspections and troubleshooting

Supervision of plant personnel during repairs

Operation and maintenance training

Performance evaluation and optimization

Diagnostics (onsite and remote)

■ Upgrade Capabilities

Automatic voltage controls

3-phase low-ripple power supplies

Collecting electrode systems

Discharge electrode systems

Rappers and rapper control systems

Purge air systems

Gas flow distribution

Internally rapped ESPs

ESP rebuilds

OEM upgrades

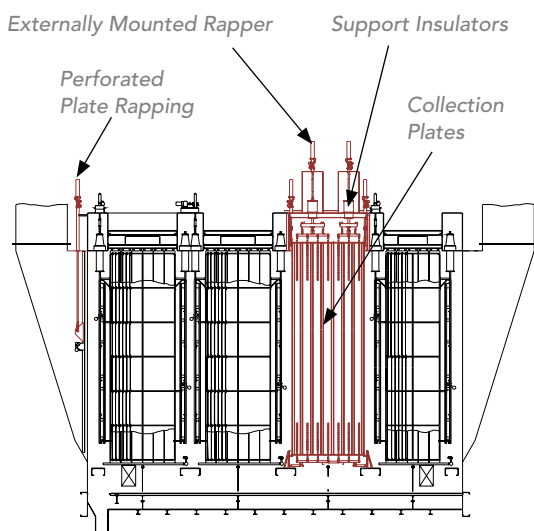
ESP to fabric filter conversions

Adding or modifying electrical sectionalization

B&W can rebuild an ESP to add electrical frames, or add or rearrange existing T/R sets to increase the number of fields in the direction of gas flow. Adding electrical sections improves collection efficiency and provides more operating reliability.

Upgrades for tumbling hammer ESPs

B&W's top-rapping conversion provides benefits that improve ESP performance. By correcting problems identified with tumbling hammer ESPs, increased reliability and collection efficiency can be achieved—all within the same footprint.



Areas in red illustrate typical upgrade components in our tumbling hammer conversion.

Upgrades include:

- Enhanced ESP efficiency due to increased gas residence time
- More electrical fields and collecting area than the original design
- New collecting plates and rigid discharge electrodes
- Central support insulators
- Improved access to internal components
- Inspection and maintenance availability at both the top and bottom of the unit
- External rappers that can be maintained while the unit is online and operating
- Adjustment of individual rappers to strike as needed with variable intensity
- Reduced maintenance, because there are no rotating parts

Real-time remote diagnostics

Since 1989, B&W's remote diagnostic and optimization service has provided invaluable assistance worldwide and is available 24/7 so you have access to an experienced professional during any precipitator upset condition.

Through the communications available to the computer system and the digital programming of the SQ-300®i Hybrid AVCs and PRC-100® rapper control, B&W can connect to your systems remotely to review precipitator and process conditions and provide optimization. With our

confidential quarterly reporting service, a B&W technician will have the opportunity to review and analyze data for trends that may not be obvious to the end-user. This analysis helps identify potential precipitator, process, and maintenance problems, aiding you in a more proactive approach to operational issues and precipitator maintenance. Quite often, this translates to less equipment downtime and reduced expense.

Potential benefits:

- Substantial cost savings during upset conditions and other events
- Peace of mind knowing help from an expert is just a phone call away
- Available and experienced help
- Quick reference resource
- Quick payback – your first recorded event (if it prevents a Service Engineer field visit, a unit de-rate, or an opacity fine) will typically pay for the price of the contract
- The ESP customer remote support engineer is in the same facility as our ESP manufacturing, shipping and engineering departments. This has proven to provide the fastest response to complicated issues and additional shipping needs.
- Less downtime of your equipment

Inspections

B&W offers world-class inspections to ensure the entire ESP system functions as efficiently as possible. With over 200 years of combined experience with nearly every type

Engineered Upgrades & Services

of ESP in the world, our expert field service engineers can assist in developing a comprehensive approach to maximize performance.

Mechanical inspection services

A mechanical inspection performed by a highly qualified B&W field engineer is the best way to find and document problems with your ESP. While we customize each inspection to your specific needs, a typical mechanical ESP inspection examines such system components as casing, roof and structural members, T/R sets, bus ducts, insulators, ventilation systems, rapping systems, gas distribution devices, collecting plates, discharge electrodes, weights and frames, and hoppers.

Electrical inspection services

Our electrical field engineers can perform a detailed pre-outage electrical inspection utilizing current or historical electrical information. This inspection can pinpoint critical areas to be addressed during the next outage or internal inspection. Armed with this information, you can better plan for the next outage, saving time and labor expenses. Electrical inspections can also be accomplished through our remote diagnostic services.

Upon conclusion of the inspection, our field engineer will discuss the findings and recommendations, so you can plan for any repairs and

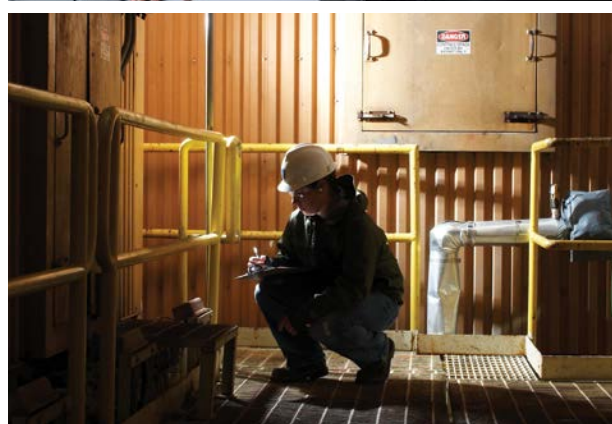
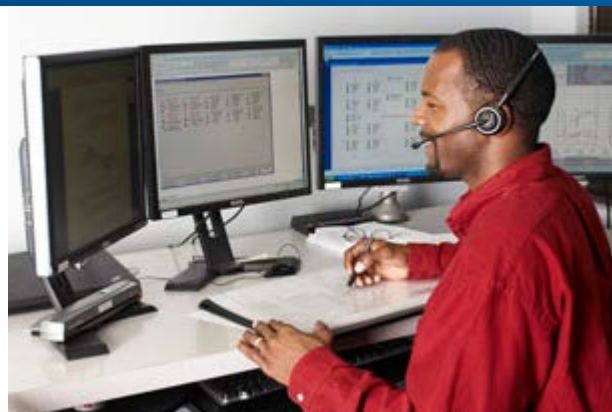
parts. A formal and comprehensive report will also be provided.

Maintenance

We offer a full range of maintenance services including labor and resource planning, repairs, upgrades, replacement parts and installation services. Individual maintenance programs can be tailored to your specific needs. When used as a preventative measure, a well-planned maintenance program can help avoid costly repairs and reduce downtime. Our engineers will work with you to prioritize both short- and long-term maintenance requirements.

Operation and maintenance training seminars

B&W understands the importance of proper operation and maintenance. We conduct seminars designed to help you solve equipment problems effectively, improve operational efficiency, and reduce costly downtime. Proper operation of air emissions control equipment can directly impact your bottom line. These sessions focus on comprehensive training and understanding of air emissions control devices and new technologies in a simple, easy to understand way.



Mechanical Components



Collecting plates

B&W's proprietary OEM and aftermarket direct replacement collecting plates are manufactured under strict QA/QC standards applied to its design, procurement and manufacturing processes, making B&W better able to meet your quality and project schedule requirements.

Whether you have an emergency need for replacement collecting plates or a well-planned rebuild, you can count on us to have the manufacturing flexibility to meet your needs. We offer:

- New and replacement plates, regardless of equipment manufacturer
- Durable materials
- Patented design features
- Versatile designs
- In-house engineering and manufacturing

ESP-1 collecting plates

B&W's ESP-1 plate provides superior design versatility through its variable stiffener positions for maximum electrical clearances between the discharge electrodes and stiffeners. ESP-1 plate features include:

- Versatile design (variable stiffener positions)
- 1.2 or 1.5 mm (18- or 16-gauge) carbon, stainless steel, or other specialty metals
- Lengths up to 12.8 m (42 ft)
- New and retrofit applications





ESP-3 collecting plates

B&W's patented ESP-3 plate is designed for unmatched collecting performance, durability and resistance to bowing, even under extreme conditions. The ESP-3 plate can easily be retrofit into most ESPs, unlike single plate designs, which require re-engineering to fit other OEM designs. ESP-3 plate features include:

- Unmatched performance and resistance to bowing
- Patented closed-section design for improved strength and durability
- 1.2 or 1.5 mm (18- or 16-gauge) carbon, stainless steel or other specialty metals
- Lengths up to 12.65 m (41 ft 6 in.)
- Panel widths of 43.18 cm (17 in.), 44.45 cm (17.5 in.) and 48.26 cm (19 in.)
- New and retrofit applications



Typical top and bottom attachment designs of the ESP-3 collecting surface.

Discharge electrodes

B&W is a leading designer and manufacturer of discharge electrodes. We offer a wide variety to meet your specifications. Because you depend on optimal ESP performance, our team can provide discharge electrodes with quick turnaround times.

RDE-1 rigid discharge electrodes

B&W's RDE-1 rigid discharge electrodes are a reliable alternative to weighted-wire discharge electrodes. Owners and operators benefit from increased ESP reliability and extended plant runs.

RDE-1 electrodes are standard for most new ESP installations and are available as upgrades to existing equipment.



Our RDE-1 electrodes are designed for optimal performance. Features include:

- A wide variety of emitter pin spacings and configurations
- Longer life when compared with weighted wire or frame-mounted wire electrode types
- Superior corona generation over a wider area, when compared with roll-formed discharge electrodes
- Durable and reliable materials of construction, including electrical resistance welded tubing, drawn arc stud welding, and 2.6 mm (10-gauge) plated or stainless-steel pins
- Simplified cleaning and maintenance



Weighted-wire discharge electrodes

When properly designed, manufactured and installed, weighted-wire discharge electrodes can provide years of reliable, cost-effective service. Through our manufacturing capabilities and knowledge of ESPs, we can review your specifications and operating parameters to supply the correct wire style, material, shroud design and weight for your application. Our wire electrode shrouds are manufactured to prevent mechanical abrasion and spit arcing. We also perform destructive and nondestructive testing of samples from each order to verify compliance with our quality standards.

Rapper components and parts

B&W can provide replacement rapper components and parts regardless of OEM, with a large assortment of steel replacement shafts, adapters, fittings, rapper shoes, ceramic and fiberglass insulator shafts, roof penetrations, and seals. Our shafts feature tapered couplings produced to exacting standards with engineered upgrades available which can increase rapping efficiency compared to original equipment.

The simple and rugged design of B&W's rappers and vibrators will effectively and reliably keep your ESP clean for improved performance.

Mechanical Components

EGR-1 rapper

Our EGR-1 rapper is a simple, rugged and reliable design that has been used worldwide for decades. The copper coil inside the upper cover creates an electromagnetic field which lifts the steel plunger to a selected height. When the coil is de-energized, gravity returns the plunger to its starting position striking the rapper shaft to dislodge dust deposits. Impact is variable to match your cleaning needs. The key features and benefits of this rapper are:

- Removable top cap enables quick and easy coil replacement
- Epoxy encapsulated coil is resistant to dust and water
- Plungers are available in 3.6 or 9.1 kg (8 or 20 lb) weights for greater flexibility in intensity
- Typical plunger is 9.1 kg (20 lb) for both collecting and high-voltage discharge electrodes
- Coils are available in 120 or 240 VDC
- Machined mounting flanges ease leveling
- Individually replaceable



IMPAK® shaft mounted rapper

B&W's IMPAK® rapper is a reliable replacement for worn or weak shaft-mounted rappers. Designed to fit most existing OEM shaft adapters, the IMPAK rapper provides more cleaning power than any similar rapper. The 8.2 kg (18 lb) plunger is spring-assisted for greater impact force, with the capability to strike four times per second. The coil is immersed in a plasticizing compound that bonds it to the tubular housing and protects it from water, grit and dirt. The spring is constructed of vanadium alloy, a material known to withstand millions of cycles. The IMPAK rapper can be supplied with mounting bases to match most ESP rapper shafts.

Pneumatic rapper/vibrator

Our economical and dependable pneumatic rapper effectively removes stubborn deposits and is suitable for pulp and paper recovery boilers and copper smelting applications. Our pneumatic rapper design has been shown to consume 20 to 25% less compressed air, while operating at 20 to 25% higher frequencies compared to other designs. It delivers efficient cleaning and reduces operating expenses at an affordable price. Key features include:

- Air-cushioned piston for reduced stress to head plate of rapper
- Intensity control from direct correlation between air pressure and output
- Polymer coating on piston for lifetime lubrication (or noncoated for use with air line oilers)
- Tapered to fit standard shaft designs of 3 degrees, 30 minutes

Boot seals

B&W's boot seals are designed to fit all major ESP brands. Leaking, cracked or damaged boot seals can lead to water and air in-leakage around rapper shafts. This can result in corrosion damage of the shafts, binding due to scale and particulate buildup, and leakage into the treatment zone of the ESP. We offer a full line of boot seals in a variety of compounds for different temperature ranges and applications.



Mechanical Components



Purge air systems

A properly designed purge air system supplies clean, heated air to the insulators at a temperature above the acid dew point and provides constant flow through the insulator under all operating conditions. B&W can analyze your existing system, including key components such as filter, blower, heater, feedback instrumentation and controls. We can provide performance improvement recommendations or engineer a replacement system.

Insulators

Insulators are used to physically support and electrically isolate the high-voltage system from the grounded sections of the ESP. The excellent strength and thermal resistivity of materials used to manufacture B&W insulators make them highly dependable. Our insulators are strength and dielectrically tested to levels far exceeding typical operating conditions. All types meet or exceed original design specifications.

Insulators are critical to the performance of your ESP. Because normal insulator lead times can be 3 to 4 months or more, we maintain a working inventory to reduce lead times and, in most cases, ship from stock.





Access doors

Quality access doors provide a tight seal to impede corrosion. B&W's standard carbon steel access doors withstand harsh environments and hard wear, and are designed to provide many years of leak-free service. In addition to carbon steel, we provide doors in stainless steel and other specialty metals. Regardless of the original supplier of your ESP, we can supply a door that will stop damaging air in-leakage.



Door seals, gasketing materials

Over time, door seals can shift, deform, become brittle or fail to seal after doors begin to warp with temperature changes. B&W stocks a variety of quality door seals to meet the specific needs of most applications. Typically, a door seal is packaged in 30.5 m (100 ft) coils. High- and low-temperature caulking materials are also available.



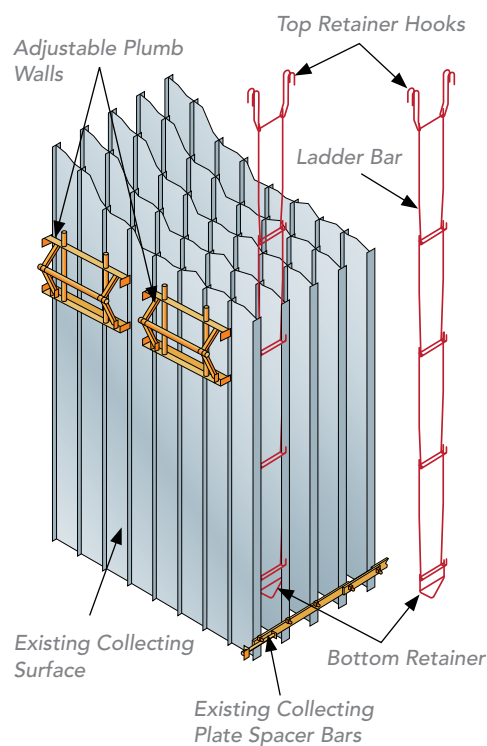
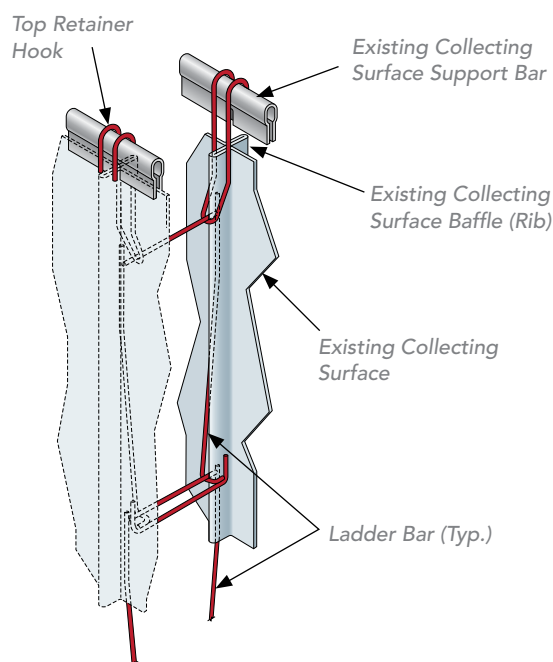
Mechanical Components

Straightening systems

To restore ESP performance, ladder bars can be installed in the gas pass between the stiffeners of bowed collector plates. B&W offers customized ladder bars to fit most major ESP designs. Even severely bowed collector plates can be restored using our patented ladder bar system. Customized options are available to straighten a wide range of collector plates.

Ladder bars install quickly and easily to create a permanent repair that not only removes bowing, but prevents it from occurring. Hooks at the top of the ladder bar assembly hold it in position, with no welding, bolting or riveting required. ESP performance can be restored during a short outage at a fraction of the cost of plate replacement.

The ladder bar system is complemented by other products that improve the effectiveness of the straighteners. Beta bars are adjustable jacks used between the first collector plates and the wall to provide a stable foundation for the ladder bar system. Side spacers are used at the leading and trailing edges of the plate field to hold the correct spacing, while custom-sized link bars provide isolation of the collector plate bundles for uncompromised rapping. Adjustment bolts are used to give precision alignment of the collector plates. The complete system assures the best alignment and highest power levels.



ESP hopper evacuation

B&W has significant expertise to support precipitator hopper evacuation as part of our broad precipitator parts and services capabilities.

Where specialized ash handling expertise is required, we can coordinate with experienced industry partners to help deliver effective and reliable hopper evacuation solutions.

Electrical Components



With more than 18,000 control systems successfully installed in 52 countries around the world, B&W's electrical products are proven to be effective, accurate, reliable and easy-to-use systems.

The SQ-300®*i* and PRC-100® controls are fully digital with no potentiometers or meters to adjust. They are built using rugged, solid-state components with high tolerance. Hardware and/or software potentiometers are not necessary for calibration and control settings are resistant to vibration, heat or cold. Our manufacturing procedures are designed for high reliability. Conformal coated boards are housed inside a welded aluminum enclosure to protect the control from environmental conditions, radio frequency interference and electrical transients.

Controls and software can have a significant effect on the performance of your ESP. Our technical experts continually develop ways to improve upon current designs and functionality.

To take advantage of the many benefits available from the latest technologies, your existing controls can be converted to our SQ-300*i* automatic voltage controller and PRC-100 programmable rapper controllers.

Conversion is fast and easy. All necessary instructions and drawings are supplied to help you with the conversion and installation process. We can also provide experienced onsite installation support and our remote diagnostics team will help you maintain your ESP at peak performance.

Upgrading existing B&W equipment

Introduced in 1989, the SQ-300 AVC (automatic voltage control) and PRC-100 rapper control have been the premier controls for industrial electrostatic precipitators worldwide and were engineered for extreme reliability and user friendliness.

Since their introduction, technological advances have made numerous components obsolete. In response, B&W introduced the next generation of precipitator control systems: the SQ-300i, SQ-300i Hybrid, PRC-100 and Precipitator Manager™ software. These systems are manufactured with the same rigor and specifications as their predecessors, providing reliability and functionality utilizing today's technologies.

As the stock of components for our older generation controls are now depleted, we recommend upgrading to the latest generation systems. To help with this upgrade, we have packaged innovative upgrade kits and standardized our processes to facilitate a seamless and cost-effective transition, so you can take advantage of the latest features and technologies.

SQ-300i Hybrid Upgrade



BEFORE



AFTER

PRC-100 Upgrade



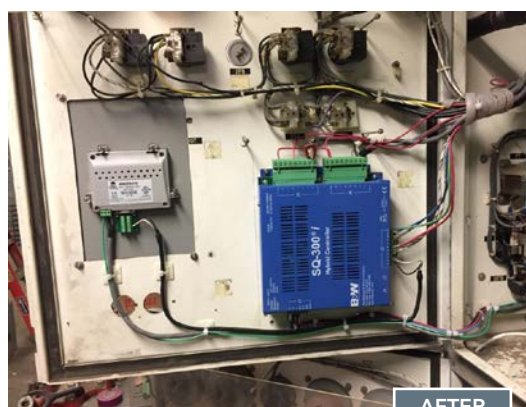
BEFORE



AFTER



BEFORE



AFTER

SQ-300®i Hybrid automatic voltage controller (AVC)

The SQ-300i Hybrid automatic voltage controller can replace single-phase or three-phase AVCs from any manufacturer and is an easy upgrade from previous SQ-300 models.

Advantages include:

- A reduced size, one-piece construction solution for single-phase power supplies. The same control can be used for upgrading to a 3-phase low-ripple power supply with a simple, downloadable, firmware update.
- Conformal coating of PCBs for environmental protection
- MET, CMET, CE certified
- Super fast, patented spark rate algorithm. This technology ensures maximum power level is applied regardless of ever-changing conditions within the ESP.
- An embedded control system with increased speed and reliability by communicating directly via Modbus TCP/IP to your DCS system or to B&W's Precipitator Manager and SQControl software packages. Each control is configurable to a unique IP address and subnet mask.
- On-board flash memory provides the ability to perform online enhancements and troubleshooting. This feature also means upgrades can be implemented more easily, either locally or remotely.
- On-board oscilloscope provides the ability to see actual precipitator waveforms external to the cabinet, thus alleviating arc flash protection concerns.
- Alarm conditions are displayed with the nature of the problem. Alarms include: overcurrent, undervoltage, imbalance and Hz mismatch. Electrical indications at the time of the alarm are frozen on the display to aid in troubleshooting.
- Monitors secondary voltage minimum, average, and peak values; an algorithm can detect back corona conditions based on the relationship between the secondary voltage curves.
- Intermittent energization capability



Electrical Components



Typical single-phase AVC cabinet



Typical three-phase AVC cabinet

- Ability to control tumbling hammer rappers and perform power off rapping
- Digital and analog input/output capability
- Electrical indications, oscilloscope, VI curve, history, alarm log and control setup are provided

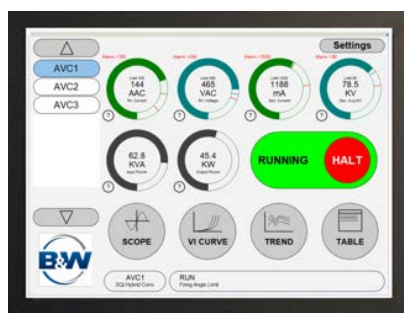
through a color graphic touch screen operator interface that simultaneously monitors all SQ-300i controllers.

- A color touch screen, auxiliary digital display for each control provides electrical indications, operational messages and halt/run functionality.

- Interfaces with other B&W software and plant systems (via OPC or other protocols) to provide a unique total precipitator control package.
- Capable of real-time remote diagnostics



SQ-300[®]i Hybrid AVC



Operator interface



Auxiliary display

PRC-100® programmable rapper controllers

The PRC-100 controller system can replace rapper controls from any manufacturer and is an easy upgrade from previous PRC-100 models.

Advantages include:

- Small, modular footprint enables ease of installation and troubleshooting.
 - Controls any type of high-current rapper and vibrator
 - Controls low-current solenoid outputs for pneumatic vibrators, acoustic horns, and tumbling hammers
 - Reverse polarity firing for EGR-style rappers; prevents the magnetization (magnetic lock) of electric gravity-style rappers; can demagnetize rappers that have become magnetized from prior use in systems that do not have this very important feature
 - Tenths of a half-cycle control for EGR-style rappers and intensity control for vibrators
 - Ability for a fail-safe, user-defined "default" program that operates all local functions if the supervisory Precipitator Manager software is shut down or disconnected from the rapper control, ensuring continuity of rapping until the issue is resolved.
 - Conformal coating of PCBs for environmental protection
 - MET, CMET, CE certified
- An embedded control system with increased speed and reliability by communicating directly via Modbus TCP/IP to your DCS system or to B&W's Precipitator Manager and SQControl software packages. Each control is configurable to a unique IP address and subnet mask.
 - On-board flash memory provides the ability to perform online enhancements and troubleshooting. This feature also means upgrades can be implemented more easily, either locally or remotely.
 - On-board oscilloscope provides the ability to see rapper firing pulses external to the cabinet, thus alleviating arc flash protection concerns.
 - Current measurement from each rapper provides the ability to generate open and short alarms as well as for display and trending. When a rapper fails due to a short, it is permanently disabled until it is cleared by the user. Additional safety is added for short protection by stopping the firing pulse to the rapper within one-half cycle of detection. Can interface with the SQ-300i AVC controls to perform power off or reduced power rapping.
 - User-friendly programming through the B&W Precipitator Manager software allows for infinite rapping groups or programs and anti-coincidence firing.
 - Interfaces with other B&W software and plant systems (via OPC or other protocols) to provide a unique total precipitator control package.
 - Capable of real-time remote diagnostics



Typical PRC-100® rapper control cabinet



PRC-100® controller module and power distribution module.

Electrical Components

Precipitator Manager™ software

B&W's WinDAC®, WinRAP® and supporting software* were first introduced in the 1990s. For two decades we have made significant improvements to these software programs to meet our customers' needs. However, to take advantage of the numerous advances in our precipitator controls and in computer hardware and operating systems, we released Precipitator Manager in 2015.

** B&W's older generation of precipitator control software is not actively being developed and is only compatible with Windows 7, which is no longer supported by Microsoft.*

The Precipitator Manager software is a comprehensive software solution for your ESP, combining multiple programs into one. The software consists of the base module with multiple optional modules available to enhance functionality. All modules are designed specifically to work within the same framework. You decide which modules are required so that you can monitor and control your AVCs, rappers, analog and digital I/O, DCS and PLC communications, and more, all from a single, convenient user interface.

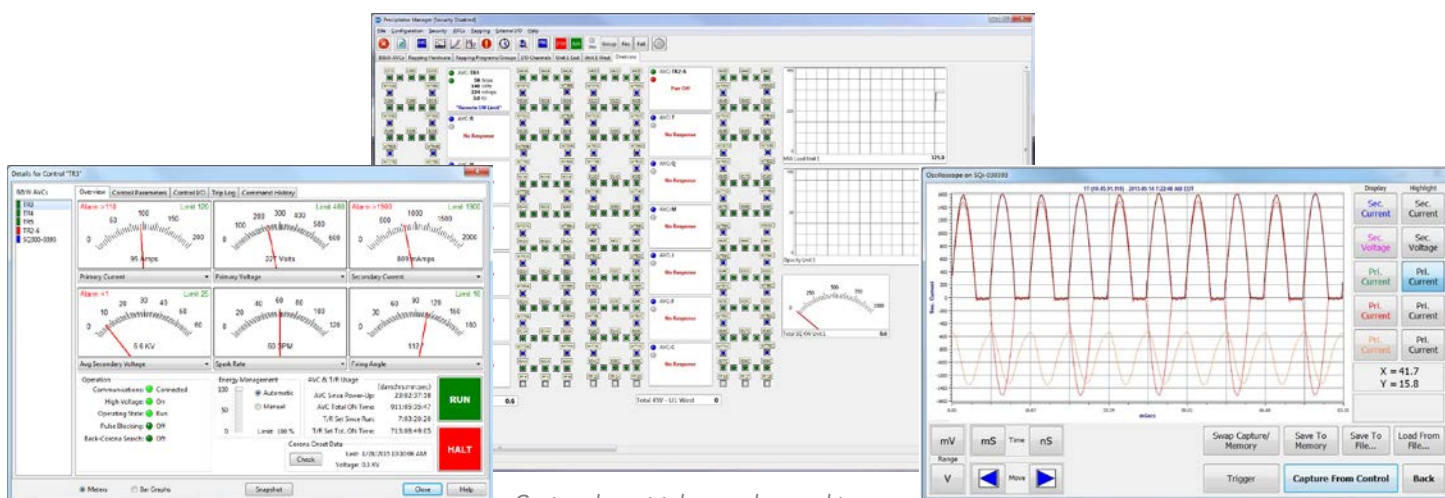
The Precipitator Manager software's base module supports all other modules and includes an I/O Manager for built-in OPC client/server functionality. The I/O Manager is also used to send data to and from many DCS systems including Allen-Bradley® (via RSLinx™), OSIsoft®, PI System™ and many others.

Standard modules and features:

- Base module (performs all the fundamental software tasks including communications, data collection, backup, security and graphic display configuration)
- ICP Server module (to obtain data from B&W hardware I/O)
- Modbus slave (server) and Modbus master (client) module (to send or receive data from external Modbus/TCP devices or DCS)

Optional modules and features:

- WinDAC module (manages SQ-300i and other AVCs)
- WinRAP module (for configuring PRC-100 rapper hardware and rapper programs)
- Power Regen module (automatically cycles SQ-300i AVC power on/off in response to system conditions and set points)
- Remote Rapping module (provides basic rapping functions via a remote B&W operator interface)
- OPC Echo (for OPC server-to-server communications)



This AVC details screen (in the WinDAC Module) provides an overview of operation

Custom layout tabs may be used to display multiple types of data points

The Scope screen allows precipitator waveform viewing without opening the cabinet



Power supply options

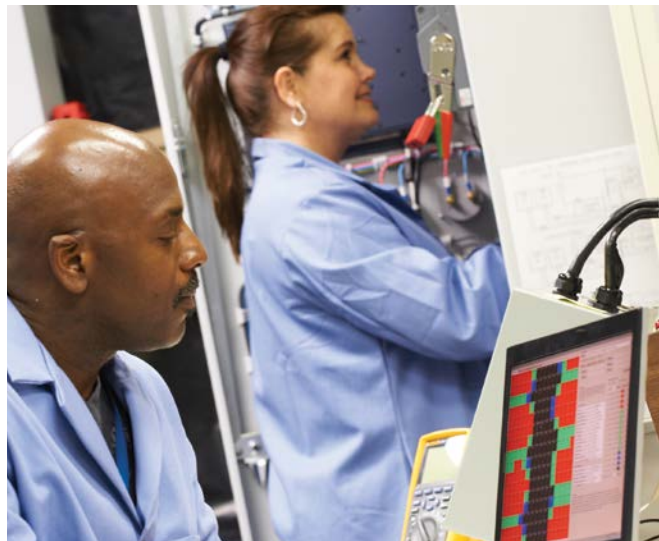
B&W provides a range of technologies to increase collection efficiency. These devices operate by reducing the amount of DC ripple that is applied to the ESP field. Decreasing the amount of DC ripple allows power to be elevated to near peak secondary voltage levels. This causes corona power to increase, thereby increasing migration velocity resulting in improved collection efficiency. Options include:

- Conventional single-phase transformer/rectifier (T/R) set (50/60 Hz)
- Conventional single-phase T/R with variable inductance–current limiting reactor (VI–CLR)
- Conventional single-phase T/R with JuiceCan® precipitator power maximizer
- Three-phase T/R (50/60 Hz)

Performance enhancement hardware

JuiceCan® precipitator power optimizer

This compact, easy-to-install, patented technology can significantly boost power delivered to the ESP. This capacitive device smooths the output waveform from a conventional T/R set resulting in an increase in migration velocity, thereby enhancing collection efficiency.



Electrical Components



CPM®700 continuous particulate monitoring systems

Unlike traditional particulate detection methods that simply measure light intensity, B&W's CPM®700 series systems take the guesswork out of particulate monitoring by measuring light modulation, a technique that virtually eliminates false or non-detection of dust and inaccurate particle levels. Our CPM systems bring a real-time approach to emissions monitoring, alerting users as problems occur.



Voltage dividers

Voltage dividers can be used to evaluate and troubleshoot ESP performance. Designed to maximize the functionality of existing voltage controls, they allow generation of V-I curves, operation of undervoltage alarms, or accurate evaluation of ESP performance.



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LITERATURE

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