



POWERPLUS
CLEANING SYSTEMS



IMPULSE[®] **Cleaning System**

**Improve Performance
and Efficiency**

**The non-erosive, extremely
reliable boiler cleaning system**

IMPULSE Cleaning System

What it Does

The IMPULSE Cleaner mixes ethylene gas and air and ignites it to create a detonation, the shockwave created provides the motive force needed to effectively clean ash deposits from the outside of the boiler tubes.

The IMPULSE Cleaning System operates on-line, and uses a series of controlled and repeated shockwaves to proactively dislodge buildup from heat transfer surfaces.

While powerful, the IMPULSE Cleaning System will not damage or erode heat transfer surfaces. It's also virtually maintenance free.

Buildup, fouling and slagging of heat transfer surfaces can cause tubes to become insulated with particulate. This diminishes convective heat transfer, resulting in reduced efficiency, and requires more fuel to maintain steam output. The powerful IMPULSE Cleaning System can be used with, or potentially replace, alternative cleaning systems like sootblowers, which need frequent and costly maintenance.

The IMPULSE Cleaning System, by PowerPlus Cleaning Systems, enhances boiler operation and minimizes high maintenance expenses associated with other cleaning methods.

This revolutionary technology offers significant advantages over traditional cleaning methods such as:

- Soot blowing
- Water Cannons
- Sonic Cleaning
- Blasting
- High-pressure water washing

How it Works

Using groundbreaking jet propulsion technology, impulses form in a controlled, pulsed manner to direct cleaning waves at surfaces where debris has collected.

The cleaning cycle results from a complex process — but it's fully managed by a simple, automated control system.

Here's how the cleaning cycle works:

- Each burst delivers fuel and air to the combustion chamber
- The mixture ignites and accelerates from subsonic to supersonic Mach 5 speeds
- A supersonic impulse exits the IMPULSE cleaner and travels into the boiler for cleaning
- This process repeats up to 2 times per second
- The strength and frequency of operation is adjustable, depending on the application

The shockwave passes around obstructions, encompassing problem areas, which are typically unreachable by traditional cleaning methods.

The result? Fewer unplanned outages, lower operational costs, optimized heat transfer efficiency and increased performance.

Can Your Sootblower Do That?



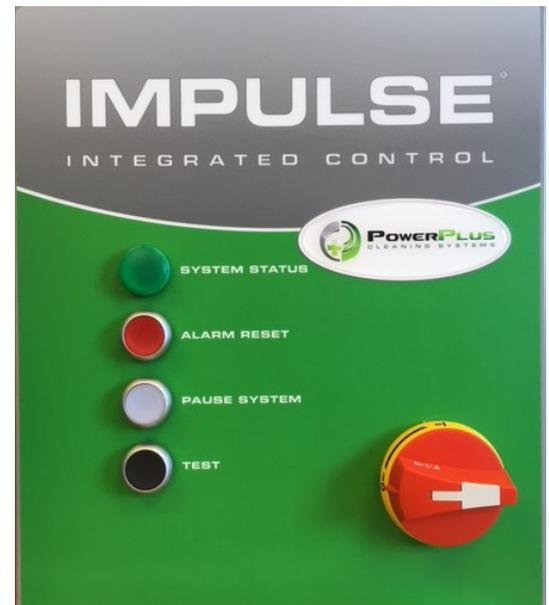
Specifications

Controller:

| | |
|---------------------|--|
| External Dimensions | ~14" x 12" x 8" (~35.5 cm x 30.5 cm x 20 cm) |
| Weight | 23 lb. (10.4 kg) |
| Input Voltage | 120/240 VAC |
| Input Frequency | 50/60 Hz |
| Input Current | 0.9 Amps @ 240 VAC/1.8 Amps @ 120 VAC |

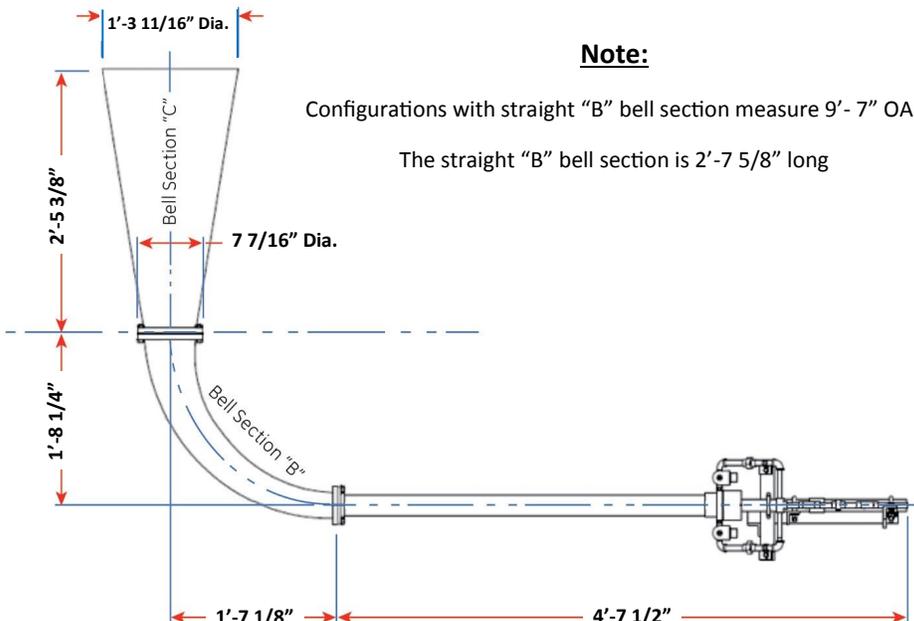
Controller Operating Parameters:

| | |
|----------------------------|--|
| Operating Temperature | 120° to 158° F (48.9° to 70° C) |
| Operating Humidity Maximum | 90% Relative Humidity, non-condensing |
| Operating Altitude Range | 0-9842 ft. (0-3000 m) |
| Storage Temperature Range | -68°F to 122°F (-20°C to 50°C) |
| Storage Humidity Range | 20-50% Relative Humidity, non-condensing |
| Storage Altitude Range | 0-9842 ft. (0-3000 m) |



IMPULSE System Operational Specifications:

| | |
|----------------------------------|---|
| Frequency of cleaning cycle | Typically every 30 minutes to 2 hours |
| # of impulses per cleaning cycle | 20 bursts typ. (Can be programmed) |
| Material | Stainless steel |
| Max Operating Temperature | 1800° F (982°C) |
| Weight | 205 lbs. (93 kg) |
| Air Consumption | 100-120 SCFM @ 70-90 PSI (47-57 l/s @ 4.83-6.21 bar) |





Harness the Power of Online Cleaning Technology

- Removes thick and stubborn ash deposits better than traditional cleaning methods
- Reduces or eliminates the need for steam soot blowing
- Enhances long-term operability, limits unplanned outages.
- Reduces platenization
- Fuel-efficient design offers low operating cost with minimal maintenance
- Can integrate into plant control systems or operate in self-timed mode
- Cleaner tubes improve heat transfer and overall efficiency of boiler
- Operates online using proactive cleaning vs. requiring an outage and reactive cleaning
- Will not cause abrasion or erosion to boiler tube surfaces
- Easy and inexpensive to install and maintain
- Small footprint preserves valuable space
- Uses minimal amounts of compressed air and fuel

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