



**HARTFIEL**<sup>®</sup>  
AUTOMATION

**FIER**   
**AUTOMATION**   
A Hartfiel Automation Company

# DUST COLLECTION

Solutions

## MAC® PULSE VALVES

### High Performance. Long Life.

The MAC Pulse Valve series was developed to replace current diaphragm style technology and create a more robust and reliable valve solution in industrial applications. MAC Pulse Valves are ideal to replace existing diaphragm technology in applications such as reverse jet bag houses and dust collectors, pneumatic conveying and bulk material handling.

The MAC Pulse Valve utilizes the MAC 46 Lifting series' balanced pilot technology to ensure fast, repeatable pulses. It also utilizes bonded spool technology in the main valve for superior reliability beyond existing diaphragm technology. A checked accumulator and a main spool with memory spring are used to ensure a shift back to the home position, for times when air supply may not be adequate. A line of adapter plates has also been released to replace existing diaphragm pulse valves with a direct drop-in, without disturbing existing plumbing.

MAC Pulse Valve are currently available in four sizes.



# THE CURRENT ENVIRONMENT

## The problem with diaphragm valves.

### High Energy Consumption

Dust collector systems are one of the largest consumers of air and energy in a factory environment. Energy savings for replacing diaphragm valves with a spool valve can be 20 - 30%.

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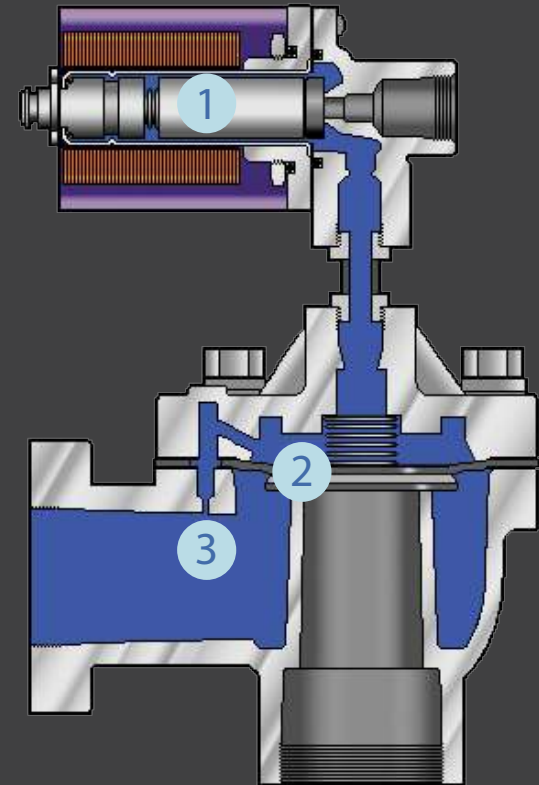
### Low Cycle Rate

Diaphragm valves are rated at 1 million cycles, resulting in more frequent downtimes and higher labor costs compared to the 10 million cycle rate of a MAC® spool-type valve.

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### High Cost of Ownership

Many leaks in diaphragm valves occur after only a short time and are not easily detected. These leaks are caused by tears on the diaphragm. As a result, air compressors work much harder to supply the same air pressure, causing higher electricity usage. When diaphragm valves tear, they can cause negative performance in other air valves on the manifold.



- 1 Contaminated Air Passes Through Unbalanced Solenoid
- 2 Diaphragm Ruptures (Air Leaks)
- 3 Small Fixed Orifice (Blocked By Contaminants)
- 4 No Manual Override

# THE MAC<sup>®</sup> PULSE VALVE ADVANTAGE

## The benefits of spool type valves.

The MAC<sup>®</sup> Pulse Valve series is designed to be a direct drop-in replacement for existing pulse technology. The MAC<sup>®</sup> solution utilizes a long life, bonded-spool design, instead of the traditional diaphragm style. MAC<sup>®</sup> also uses a balanced pilot valve that isolates the solenoid from airline contamination. Available with integral solenoid pilot as well as bleed pilot configurations.

### Maintenance

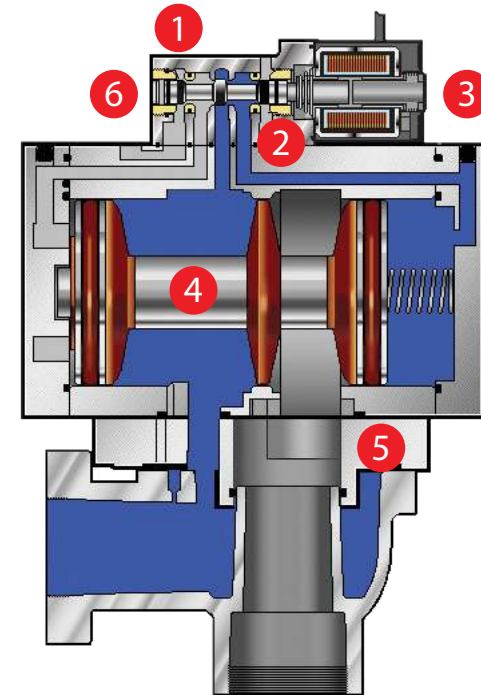
Lower cost of ownership through reduction in downtime due to high reliability. When necessary, maintenance is simplified with available spool kits.

### Return on Investment

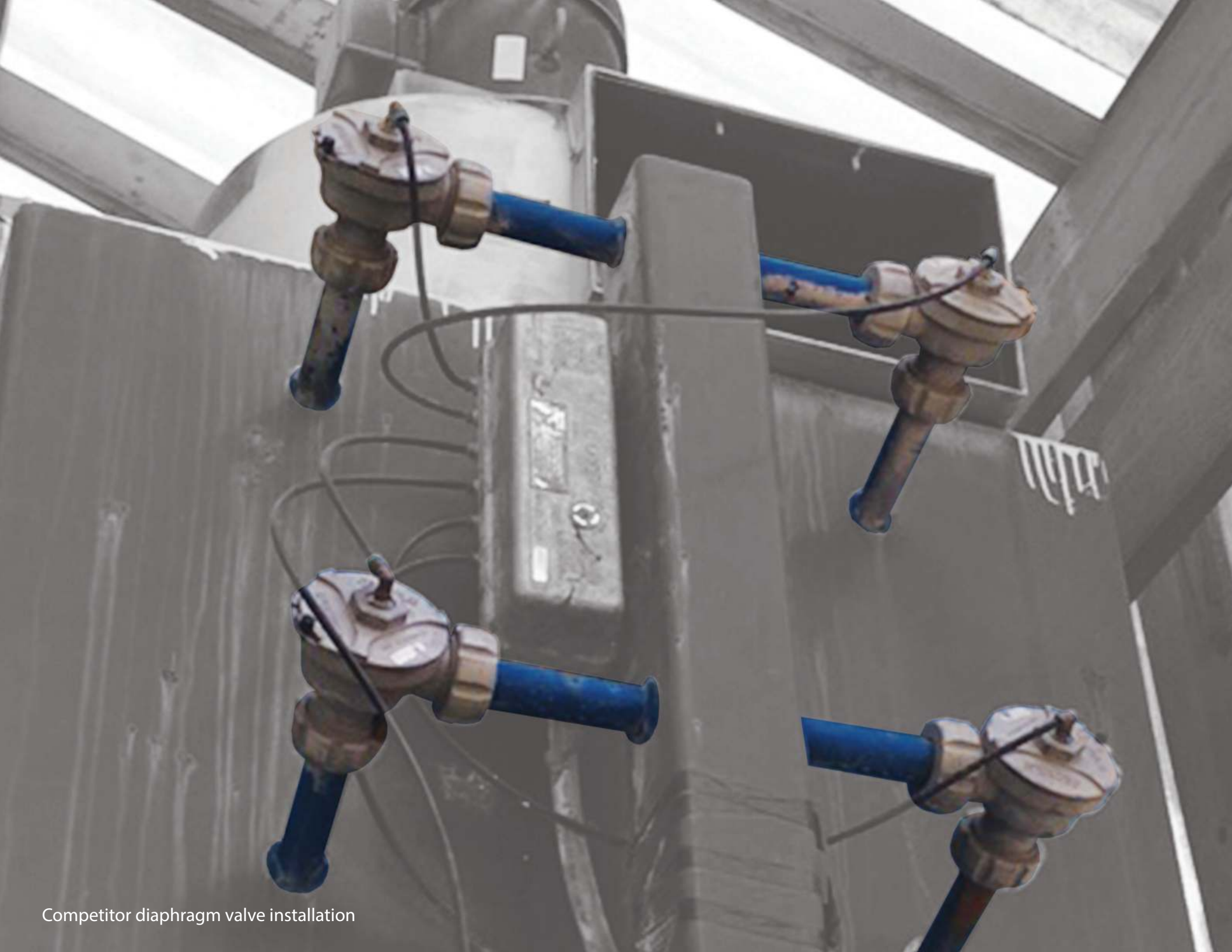
MAC<sup>®</sup> spool valves do not leak or experience blowouts. ROI is very short due to significant energy savings, extended bag life, greatly reduced replacement costs, reduction in downtime and labor savings.

### Harsh Environment Compatible

An aluminum die-cast body, nitrile seals and an environmentally protected solenoid are standard features. Viton<sup>®</sup> seals are also available for extreme temperature environments and chemical resistance.



- 1 4-Way Pilot (Maximized Shifting Forces)
- 2 D-Seal Technology Isolates Solenoid (Longer Life)
- 3 Lifting Solenoid (Consistent Response)
- 4 Dynamic Bonded Rubber Spool (Balanced, Wiping Action.)
- 5 Adapter Plate (Drop-in Replacement to Existing Base)
- 6 Manual Override



Competitor diaphragm valve installation

# BEFORE

Image of dust collection system filters using competitor diaphragm pulse valves .



# AFTER

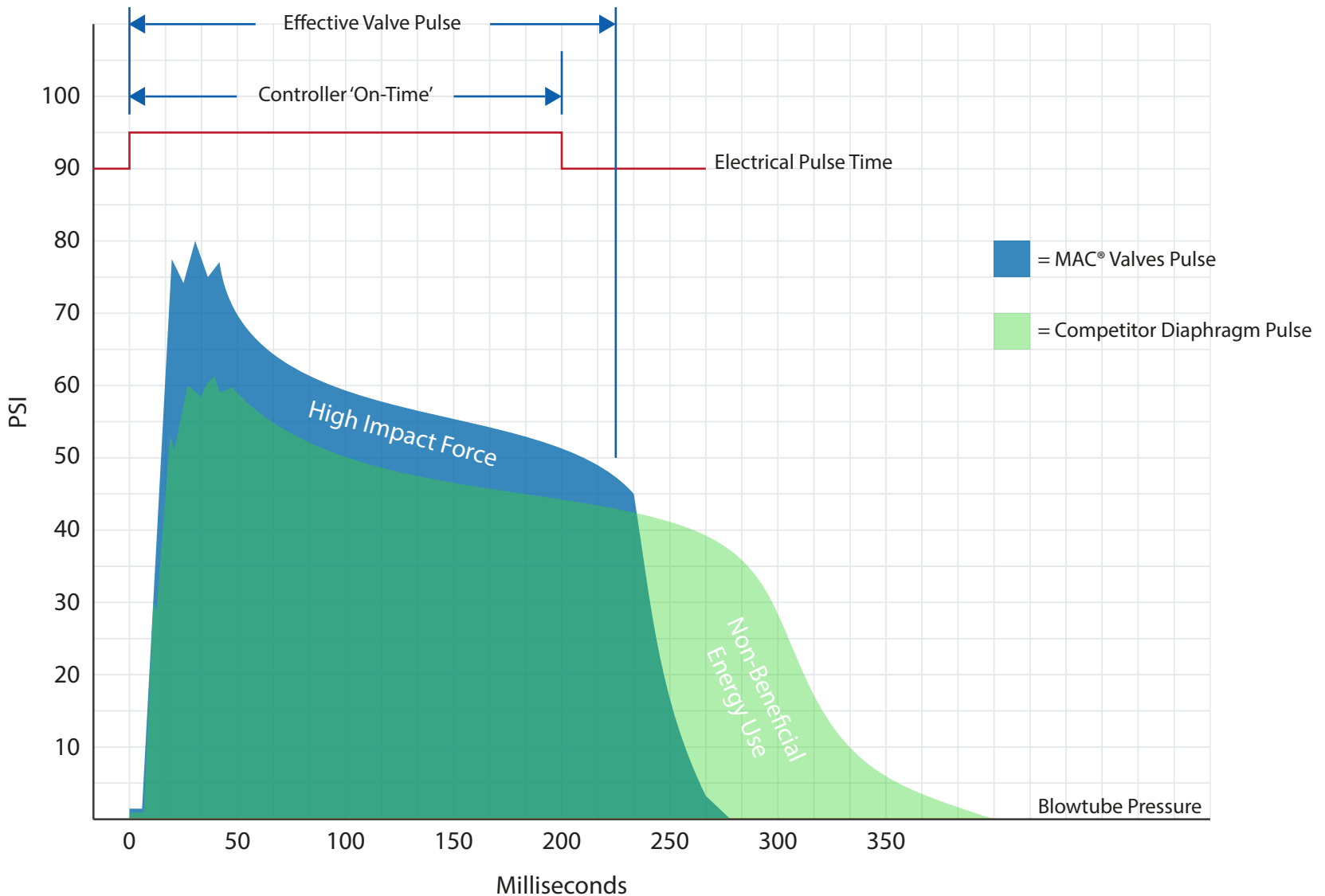
The valve for the far left filter was replaced with a MAC® Pulse Valve. This image shows the results after just 2 cycles.





# PULSE VALVE PERFORMANCE CURVE

## MAC Valves = More “Cleaning Energy”







MAC PV06 spool valve installation

# CASE STUDY : Concrete Production

## PROBLEM

A concrete production facility could not run all of their equipment simultaneously because their dust collection system was unable to handle the amount of dust produced. This caused added time in prepping material for shipment, resulting in shipping delays and increased employee overtime.

## ANALYSIS

The current diaphragm valves utilized by the customer in their dust collection system were leaving excessive amounts of dust and material on the systems filters.

## SOLUTION

The diaphragm valves were removed and replaced with MAC® Pulse Valves.

## BENEFIT

The customer is now able to run all equipment simultaneously, resulting in reduced employee overtime and the ability to meet customer deadlines. Clean-up time has been greatly reduced. Old material has been purged from the system, allowing the system to operate at a higher efficiency.



# CASE STUDY : Bakery

## PROBLEM

A production bakery facility was changing filters in their dust collection system every 2 to 3 weeks due to accumulation of product.

## ANALYSIS

The customer's dust collection system was utilizing diaphragm valves to clean their filters. These valves were grossly under-performing.

## SOLUTION

The diaphragm valve under-performing the most was removed and replaced with MAC® Pulse Valve. After manually cycling the MAC® spool valve twice, the filter was rechecked and appeared to be brand new.

## BENEFIT

Customer will realize cost reductions from a decrease in time spent changing filters and total number of filters used in a fiscal year.

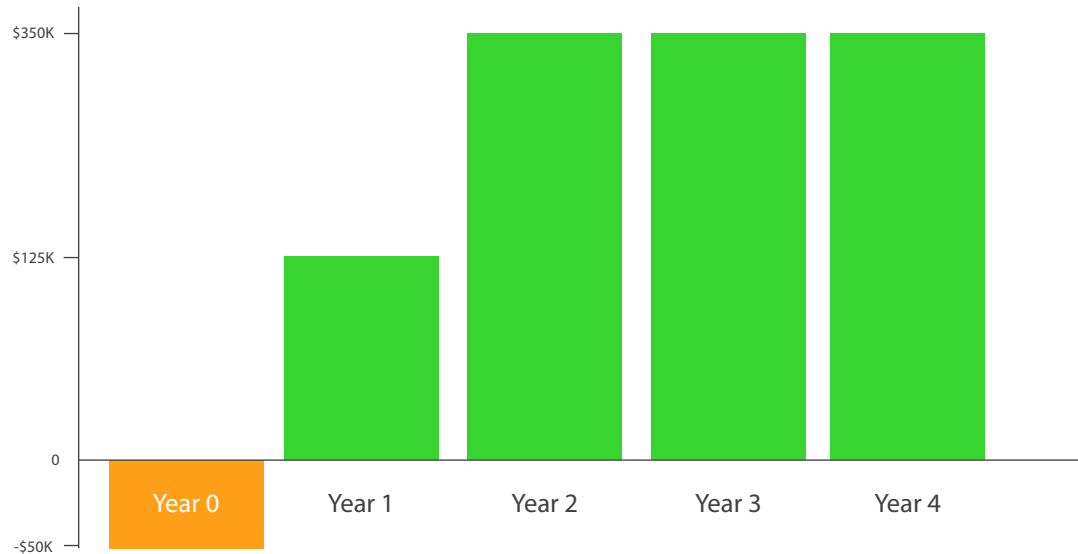
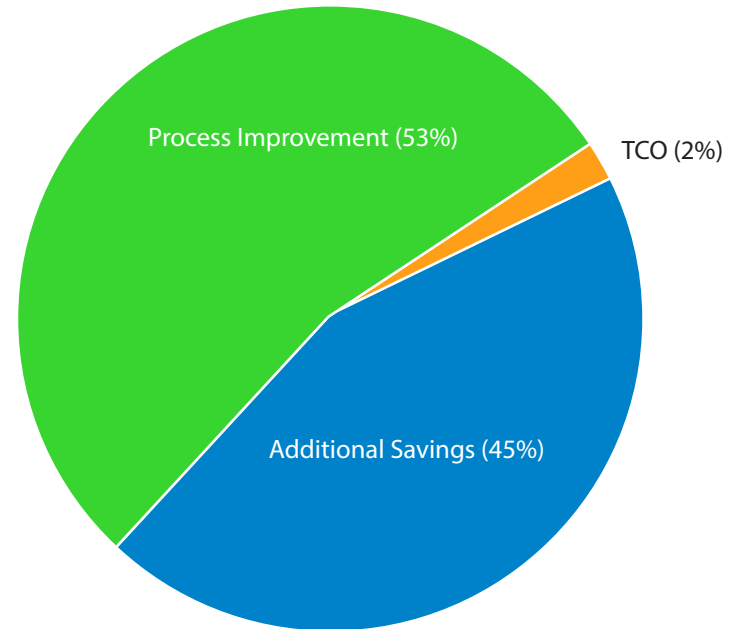


# Return on your investment.

## ANNUAL PROFIT IMPACT

Total Cost of Ownership	\$5,666.67
Process Improvement	\$183,820.00
	\$157,088.72
Total Investment	\$346,575.39 (\$265,000.00)

ROI 0.76 years



This is a sample CPR report prepared for a potential MAC® Pulse Valve customer

# Savings Summary

## PROCESS IMPROVEMENT

### Downtime Reduction

Weekly unscheduled downtime caused by dust collector	\$161,920.00
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### Scrap Improvement Savings

Reduced scrap due to failure of dust collector. $12,500 \text{ lbs/hr} \times 24 \times 365 = 109,500,000 \text{ lbs}$	\$21,900.00
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## ADDITIONAL SAVINGS

### Lowered Cost of Carrying Inventory

50% of total on shelf for competitor vs. 20% of total on shelf for MAC	\$125.00
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### Energy Savings Per Year

Catastrophic Failure \$207.36 cost per day x 6 days before changing = \$1,244.16 per occurrence (24x/yr)	\$29,859.84
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(Estimated cost of air leakage/day)*(number of days of leakage)*(number of valves leaking at a time) =	\$55,103.88
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difference between spool and diaphragm Existing: 600ccpm x 30 valves. Proposed: 50ccpm x 30 valves

### Alternative Cost Avoidance

EPA Cost reduction	\$0.00
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Equipment Rental? (crane....)	\$0.00
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Reduced Labor due to checking for leaks: (number of instances)*(length in hours)*(fully burdened labor rate) =	\$72,000.00
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(2 people \* 3 times per week)\*(4 hrs)\*(\$60.00)

Production Loss	\$0.00
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### Miscellaneous Savings

Safety Costs????	\$0.00
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# Currently available in 4 size options

## MAC® Pulse Valve PV03 Series

PIPE SIZE  
¾" and 1"

FLOW  
24 Cv



### SPOOL KITS

Nitrile K-PV001  
Viton® K-PV001-05

### BASE ADAPTERS\*

M-PV001-01 - ASCO® / Flexclean® ¾"  
M-PV002-01 - Goyen ¾"  
M-PV003-01 - ASCO 1"  
M-PV004-01 - Turbo 1"  
M-PV005-01 - Goyen 1"  
M-PV009-01 - ASCO ¾" External

\*Additional configurations available upon request

## MAC® Pulse Valve PV06 Series

PIPE SIZE  
1½"

FLOW  
53.2 Cv



### SPOOL KITS

Nitrile K-PV002  
Viton® K-PV002-05

### BASE ADAPTERS\*

M-PV006-01 - 1 1/2" Goyen  
M-PV007-01 - 1 1/2" ASCO  
M-PV008-01 - 1 1/2" Norgren  
M-PV010-01 - 1 1/2" Turbo D-Series  
M-PV011-01 - 1 1/2" Turbo F-Series

\*Additional configurations available upon request

## MAC® Pulse Valve PV09 Series

PIPE SIZE  
2 & 2½"

FLOW  
100 Cv

SPOOL KITS  
Viton® S-PV003-05



### BASE ADAPTERS\*

- K-PV003-05 Viton (includes seals and spring)
- N-PV001-01 Solenoid Adapter Plate
- N-PV001-02 Remote Bleed Adapter Plate
- N-PV002-02 PV09 Check Stem Kit

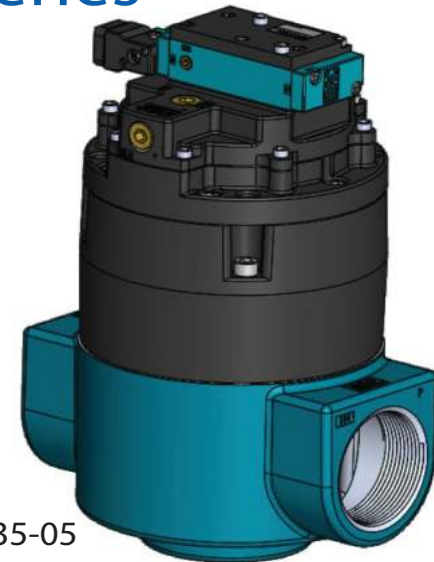
\*Additional configurations available upon request

## MAC® Pulse Valve PV12 Series

PIPE SIZE  
2½" & 3"

FLOW  
175 Cv

SPOOL KITS  
Viton® K-PV035-05



# Summary: 7 Key Advantages

of MAC® Pulse Valves  
in Dust Collection Environments

1

## Energy Savings

Powerful pulse action extends time needed between pulses ... lowering energy costs.

2

## Access

Access to valves in the system is difficult. The spool valve's long life reduces lost labor due to long repairs.

3

## Downtime

When a dust collection system fails, plant operations come to a halt. Spool valves reduce downtime.

4

## Product

Insufficient pulses cause excess waste to build up in the system and can cause a reduction in waste removal resulting in product contamination.

5

## Maintenance Costs

Diaphragm valves cause daily maintenance issues and increased labor costs. Spool valves allow for better use of labor throughout the plant.

6

## Filter Bag Life

Cleaner filters resulting from stronger pulses increase overall filter life, reducing costs.

7

## Ease of Use

Only the MAC solenoid pilot offers a manual override to test the pulse valve.







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# SMART P-LSE

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## DUST COLLECTION

### **The Real Items Facilities Need To Consider.....**

#### **Managing dust collection properly requires the following:**

Obtaining real time data allowing for actionable responses to what is happening in the system, and providing a monitoring framework which will assist in keeping the plant's dust collection assets within permit guidelines and parameters.

Compressed air energy costs are often one of a facility's highest daily expenses. Total cost of ownership of current valves and filter systems is expensive and is usually maintained on a preventative maintenance schedule and not on an as needed basis.

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# SMART PULSE

## DUST COLLECTION

### Dust Collection Valve Control, Remote Monitoring and Data Collection System

#### Dust collection utilization can make or break your business:

Dust Collectors use tremendous amounts of compressed air energy and maintenance, often times being overlooked and slowing down production. Hartfiel Automation has developed Pulse On Demand Control Boxes along with Industry 4.0 Systems to optimize your baghouses and maximize their efficiency. Optimization leads to Increased Filter Life, Reduced Air Consumption, Lower CO2 Emissions, Predictive and Preventative Maintenance and Fewer Environmental Outbreaks.

#### CONTROL OPTIONS

##### Pulse Valve Control Box 2.0

<u>Part Number</u>	<u>Description</u>
HAA52676-PVCB2.0	22 Valve Pulse On Demand Control Box with Timer Function Selection. Integrated Magnahelic Gauge and Junction Box. Nema 4x Enclosure.

HAA52676-PVCB2.0-SS	22 Valve Pulse On Demand Control Box with Timer Function Selection. Integrated Magnahelic Gauge and Junction Box. Nema 4x, 304 Stainless Steel Enclosure.
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##### Pulse Valve Gateway


<u>Part Number</u>	<u>Description</u>
SMRTPULS-MH900-Gateway	Gateway enclosure to be used with Asset Boxes. Minimum of 1 Gateway enclosure per 40 Asset Boxes.

##### Pulse Valve Asset Monitor


<u>Part Number</u>	<u>Description</u>
SMRTPULS-MH900-Node-Asset	Asset Box for Remote Connectivity to Gateway Box. 4 Ai / 4 Di / 2 Do

#### Sensor Kits

##### Differential Pressure Transmitter

<u>Part Number</u>	<u>Description</u>
 HA52373	0-25 in/WC


##### Pressure Transducer

<u>Part Number</u>	<u>Description</u>
 HA52374	0-150 PSIG, 1/4" NPT Process Connection

##### Flow/Temp/Pressure Meter

<u>Part Number</u>	<u>Description</u>
 HA52375	G1 Process Connection, -20... 60C, 0-235 PSI, 14.7 - 2945 l/min

##### Particulate Sensor , Broken Bag Detection

<u>Part Number</u>	<u>Description</u>
 HA52376	Particulate transmitter, 5"probe, UL intrinsically safe rating, 3/4" male NPT process connections, 1/2" female NPT electrical connections

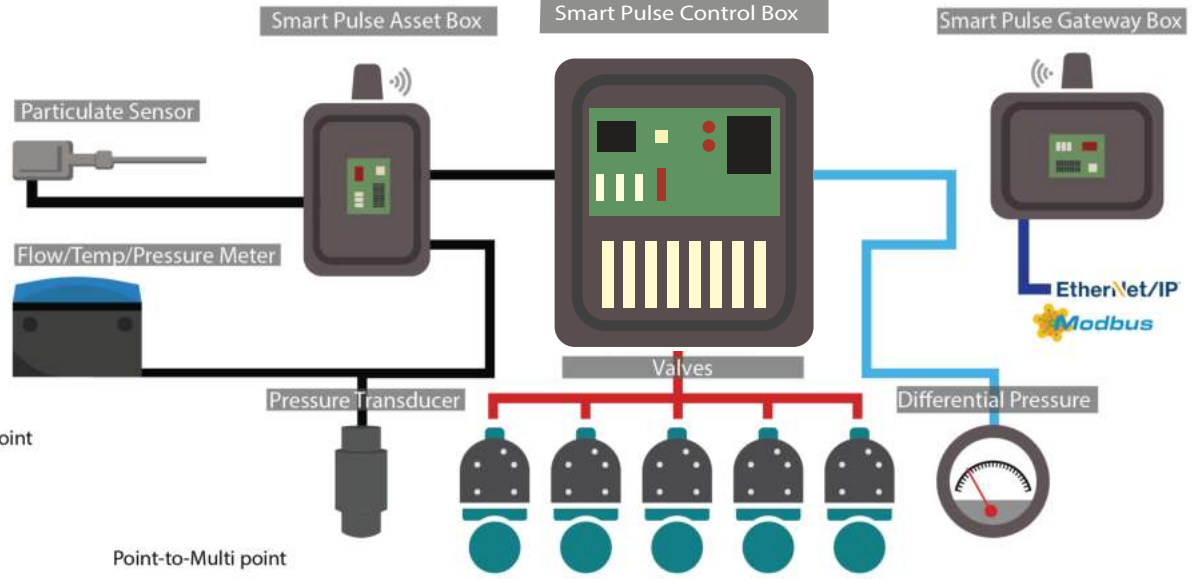
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# SMART PULSE

**Saves Energy While also Ensuring Efficiency, Reliability and Sustainability**

**Up to 40% Reduced Air Consumption**  
*(Individual Results May Vary)*

- INDUSTRIES**
- Mining
  - Steel and Cement
  - Pharmaceutical
  - Food and Beverage
  - Agriculture
  - Mixing
  - Cutting
  - Welding
  - Chemical
  - Battery



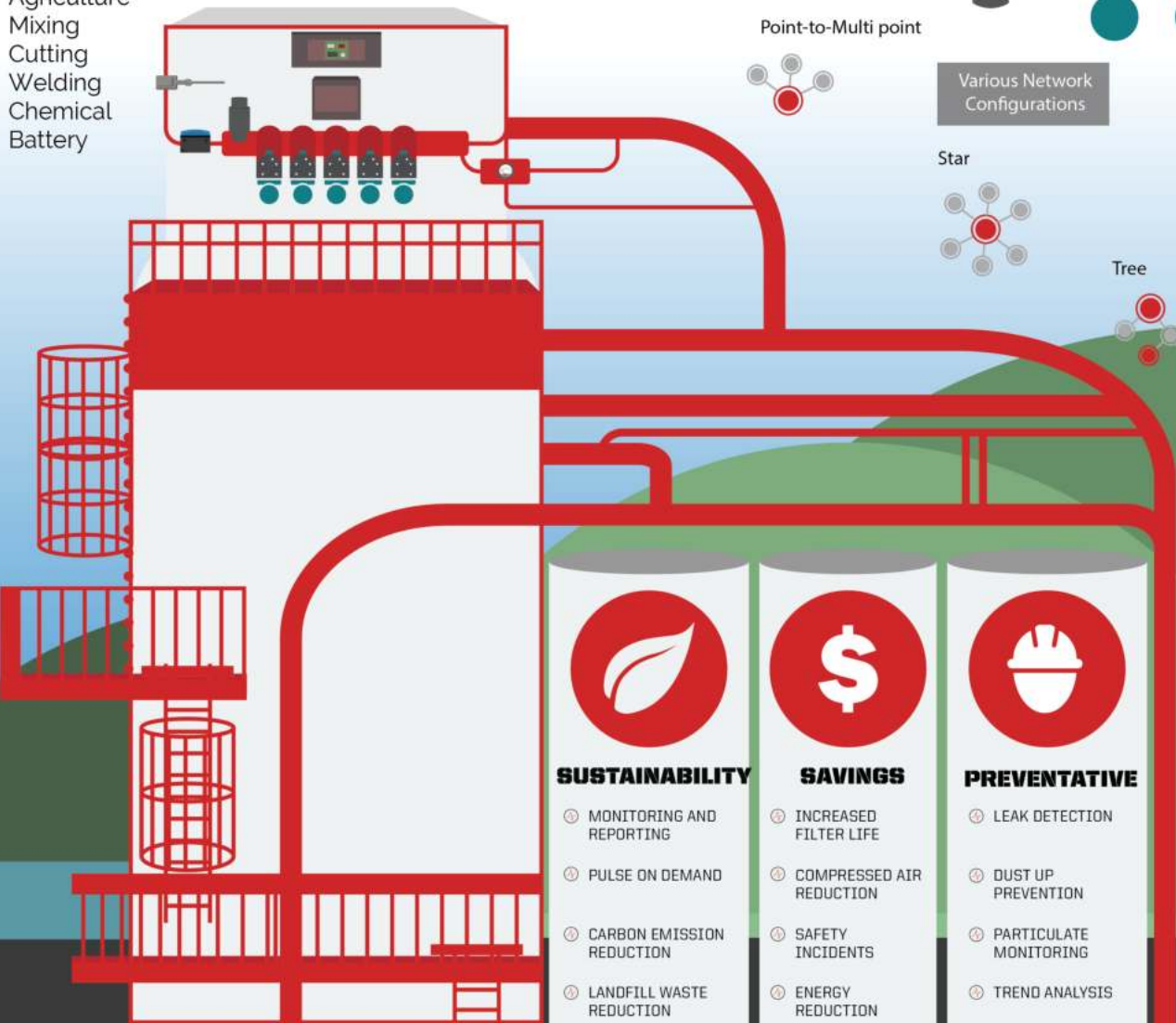
Point-to-Point

Point-to-Multi point

Various Network Configurations

Star

Tree



Receive Information via e-mail or SMS instantaneously from the convenience of your office.



**SUSTAINABILITY**

- MONITORING AND REPORTING
- PULSE ON DEMAND
- CARBON EMISSION REDUCTION
- LANDFILL WASTE REDUCTION



**SAVINGS**

- INCREASED FILTER LIFE
- COMPRESSED AIR REDUCTION
- SAFETY INCIDENTS
- ENERGY REDUCTION



**PREVENTATIVE**

- LEAK DETECTION
- DUST UP PREVENTION
- PARTICULATE MONITORING
- TREND ANALYSIS

# Hartfiel Automation Territory

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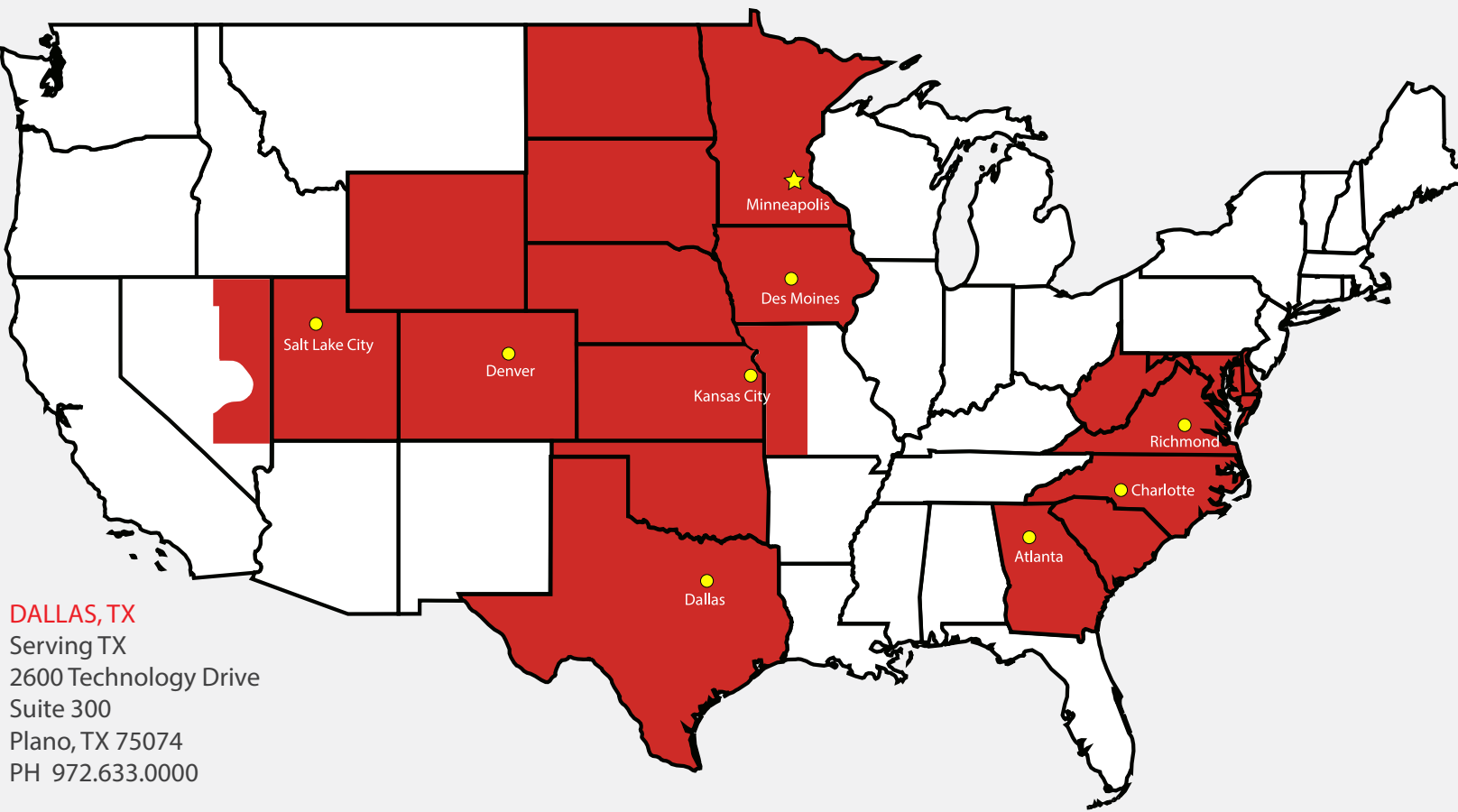
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