Making Existing Facilities Smart

Wireless Gauge Reader Industrial Applications







Reduce Energy Use
Detect Faults, Improve Uptime
Improve Production Efficiency
Enhance Safety and Compliance
Minimize Maintenance Effort

CYPRESS ENVIROSYSTEMS™

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Benefits – Wireless Gauge Reader

Labor Savings:
- Reduced operator rounds

Consumables Savings:
- Filter replacement
- Gas cylinders

Energy Savings:
- Compressed Dry Air Compressor setpoints, leak detection
- Air Handler Unit filter changeouts

Reduced Unplanned Downtime:
- Condition based maintenance

Improved Worker Safety:
- Minimize access to dangerous locations, weather, height, confined spaces

Improved Compliance:
- Hour meters, emissions filters, groundwater sump pumps

Process Optimization / Improvement
- Trending process parameters for Statistical Quality Control (SQL)

Application Examples

Compressed Air System

Energy Savings

WGR Application - Compressed Air

Customer Challenge:

Compressed air systems are one of the largest energy users in a manufacturing facility which often run at settings beyond what is needed.

Monitoring of the compressed air system is intrusive and expensive

Installing additional compressed air capacity to accommodate system needs due to excessive leakage and compressor duty cycling.

WGR Solution:

Typically manual gauges are already installed throughout CDA systems or coolant loop systems.

WGR's can monitor and alarm pressure/flow to ensure process integrity and reduce energy use.

App note available:
"Compressed Dry Air System Energy Savings"





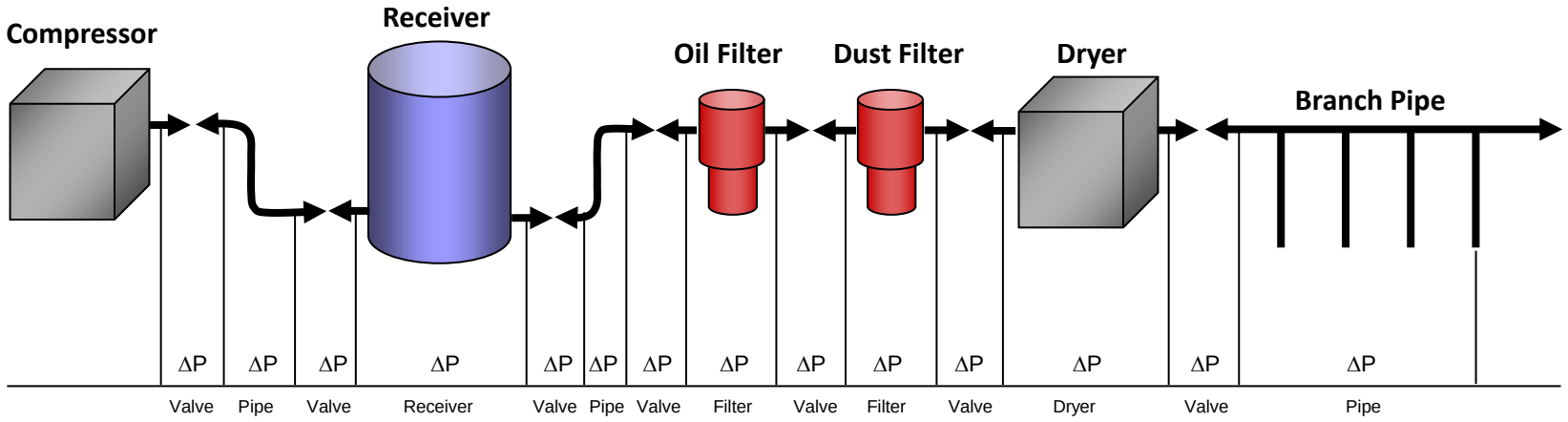
Savings on 500hp Compressed Air System can be up to $100K per year, with a 8 month payback.

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Compressed Air – Design vs. Typical Case

Design Case

Compressor Working Pressure		End User Pressure
105 psi	15 psi loss	**90 psi**



Typical Case

Compressor Working Pressure		End User Pressure
125 psi	Unknown Loss	**Must keep at least 90 psi**

Clogged Filters, Leaks, Peak Usage

Typical Plant Operator Overpressures to Compensate for Potential Losses

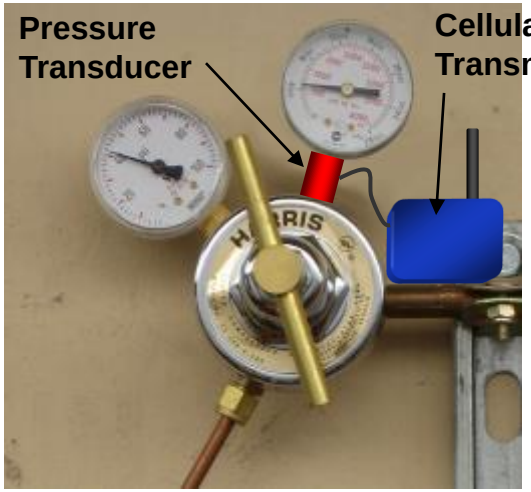
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Gas Cylinders

Labor and Consumable Savings

Wireless Gauge Reader (WGR) vs. Conventional Solution

Conventional Pressure Transducer Solution



- Requires skilled technician to install – incurs cost of team, truck rolls
- Requires cylinder/process to be taken offline
- Risk of introducing leaks
- Risk of damaging regulators

Non-Invasive, Optical Wireless Gauge Reader Solution





- Easy installation, faster deployment
- No breaking seals, no leak checks
- No disruption to customer's operation
- Long battery life – up to 5 years

WGR Provides Faster Time to Market, Lower Cost and Risk to Deploy, Sustainable Differentiation

Received Top Industry Recognition and Award

Cover Story



Gases & Instrumentation INTERNATIONAL™
The Technology and Application of Industrial, Specialty and Medical Gases™

GOLDEN GAS AWARD 2010

Gases & Instrumentation International Announces the Winners of the 2010 Golden Gas Awards

Wellesley Hills, MA—February 17, 2010—*Gases & Instrumentation International*, a MetaWord, Inc. premiere publication covering the technology of industrial, specialty and medical gases, announces the winners of the 2010 Golden Gas Awards.

This year's competition attracted more than 43 entries in 8 categories. Each product was rated on 5 criteria based on the product's ability to solve an important challenge to the gas industry; technological innovativeness; environmental "green" attributes; superior specifications in terms of power requirements, speed, footprint, maintenance; cost effectiveness, and other quality considerations. Each criterion was awarded points from 0-10. If any product came within 3% of the winner, it was given the Silver Award.

Paul Nesdore, G&I's Publisher/Editor stated that, "This is the finest array of products we have ever seen. Our judges, representing decades of experience in all aspects of gases technologies, had a difficult time, as the products entered represented the cutting-edge of gases technology and implementation."

Proven Technology Deployed Since 2008

Current Versions of WGR Already Deployed

CATERPILLAR®

- Peoria, IL ~200 Cylinders
- Initial installation in 2011
- Large site, basement areas
- Demanding, data driven end-customer

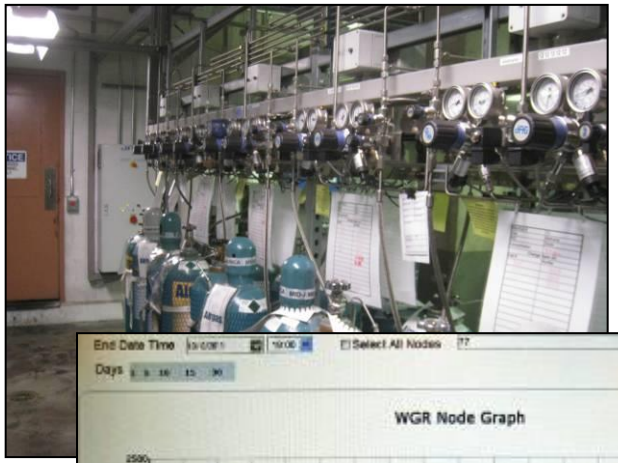




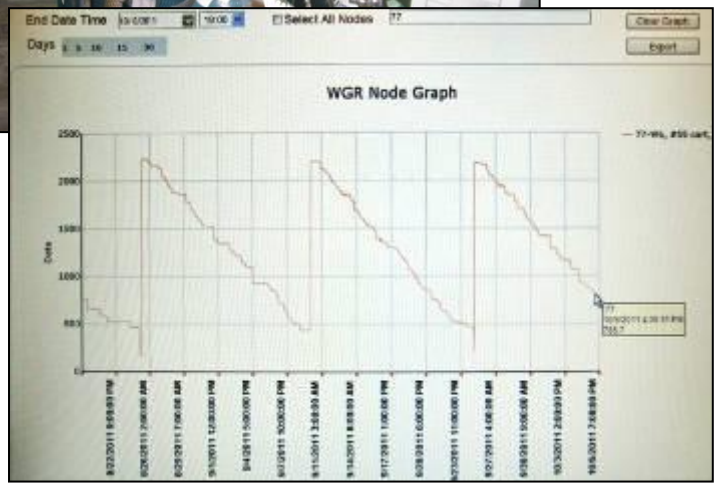
Long Distances

Basement

Concrete and Metal walls



Secure IT Environment



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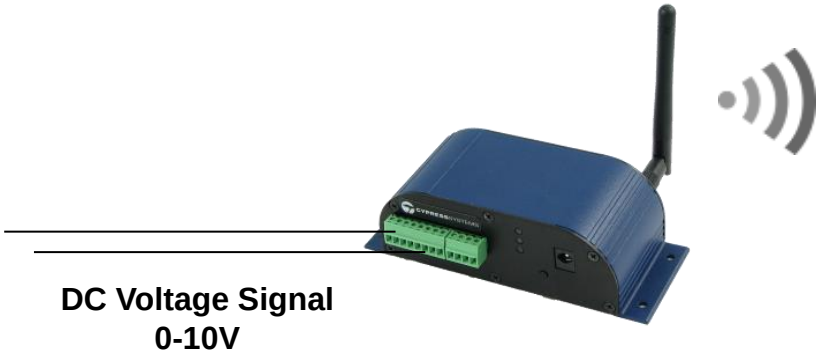
Vibration Monitoring

Condition Based Monitoring & Fault Diagnostics

Wirelessly Capture Data from Vibration Sensors



Accelerometers (DC-Response)



DC Voltage Signal 0-10V

Wireless Transmission to Blue Box

Wireless Transducer Reader (Battery Operated)

Monitor Vibration Changes Over a Period of Time (e.g. misalignment, not for high frequency analysis)

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Pumps/Compressors

Condition Based Monitoring & Fault Diagnostics

Pump Head Pressure vs. Flow Rate – Failure Diagnostics

Customer Challenge:

Detect pending failure for pumps and compressors, and proactively repair or replace before production is impacted.

WGR Solution:

Use WGR and/or WTR to non-invasively monitor pump head pressure and flow rate, current consumption and compare with manufacturer's spec.

Early detection of faults when performance deviates from spec.



WGR installation takes minutes and cost 70% less than transmitters... and may be removed and reused at other locations

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HEPA Filters

Energy and Consumables Savings

Monitoring of Legacy Air Handlers



Typical Air Handler Units



Wireless Magnehelic Reader
Monitors Filters and Airflow

- Most older Air Handler Units (AHU's) are not monitored/automated
- Labor intensive to detect problems, check filters
- Proper air flow is the critical parameter - but can only be seen via manual dial gauges (e.g. Magnehelics)
- Solution: Wireless Magnehelic Reader clamps on in minutes and transmits reading wirelessly to BMS/BAS
- No downtime, no wiring, no leak checks
- Alarm notification for filter changeout, low air flow
- Condition-based maintenance, not schedule-based

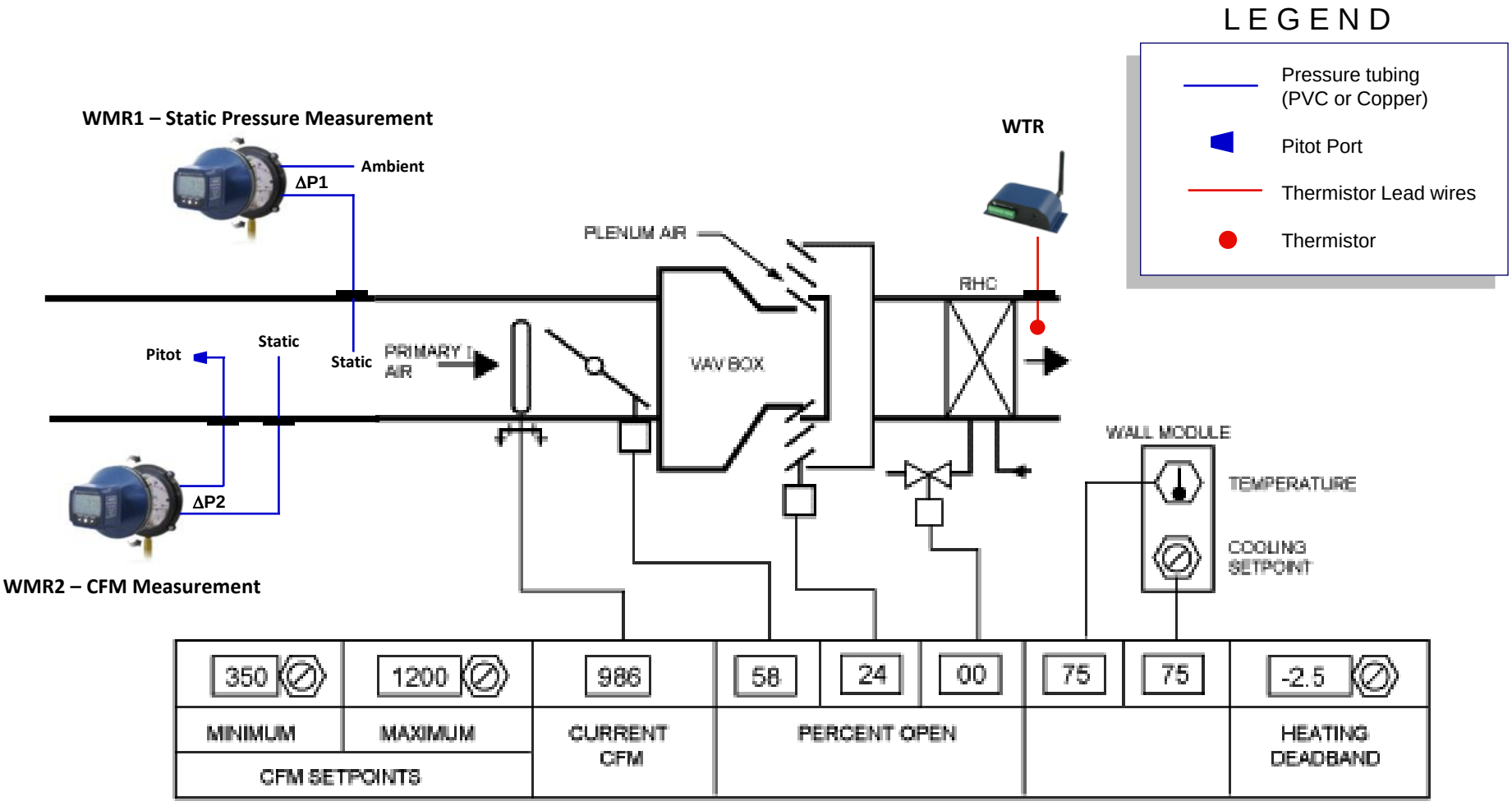


Wireless Readers
Mounts Over Existing Gauges

Enables Monitoring of Legacy Air Handlers for 70% Less Than Traditional Transducers

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Duct/VAV Box Measurements



Equipment Monitoring

Condition Based Monitoring & Fault Diagnostics

Improve Asset Health and Uptime

Customer Challenge:

Older equipment such as packaged heat exchangers, boilers, chillers, air dryers, hydraulic conveyors, water filters, HEPA filters, etc. often have little or no electronic monitoring outputs.

Adding new transducers require modifying the equipment package and may impact existing service/ warranty agreements.

WGR Solution:

Typically manual gauges are already installed on older packaged equipment.

The WGR can monitor, trend and alarm parameters for early fault detection and corrective action.

Case Studies Available:
"Facilities Monitoring"

"Tri-State Power Asset Health Monitoring"



"In the first two weeks of using the WGR, we were able to detect and develop corrective measures for a potentially costly issue that we never suspected" – Mike Long, Control System Supervisor, Tri-State Generation and Transmission

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Compliance Monitoring

Compliance Monitoring

Customer Challenge:

EPA and other agencies require detailed records for industrial sites e.g.:

- Run-time logs for diesel generators
- Filters and airflow for emissions stack
- Ground water contamination detection
- Fire protection systems health checks.

However, data collection is often manual and not easily trended. Late detection of excursion or lost records can result in significant fines.

WGR Solution:

The WGR can automatically record hour meters for equipment run-times, and monitor delta pressure for emissions flow/filter health.

Case Studies Available:

Sump pump monitoring for detection of groundwater contamination.

Fire protection systems health checks







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Paint Shop

Quality and Maintenance Savings

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Paint Shop Filter Monitoring

- Retrofit existing pressure gauges for
- remote monitoring, trending and alarming.



- Ensure positive pressure in paint areas
- Replace air filters at optimal intervals
- Reduce consumables cost, maintenance labor, and fan energy cost





Analog Magnehelic Gauge



Wireless Magnehelic Reader

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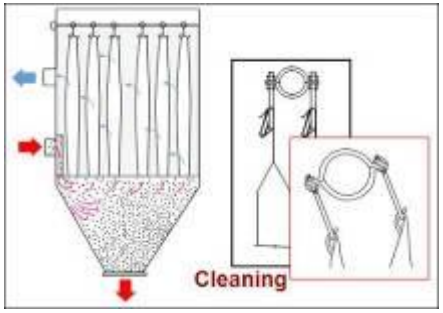
Bag Houses

Compliance and Safety Improvement

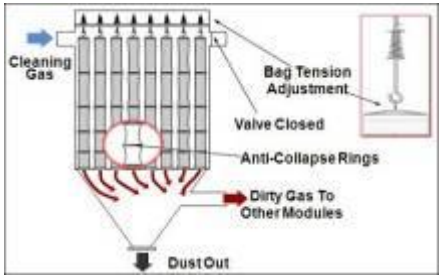
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Application – Bag House and Filtration

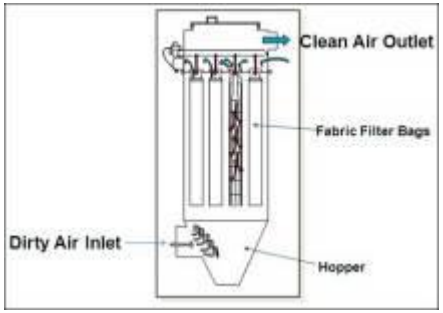
- Approximately 5 million baghouses installed worldwide remove pollutants and particulates from the exhaust air of industrial facilities
- Avoiding baghouse failure is critical to ensure safety and regulatory compliance
- Improperly maintained baghouses can have catastrophic fires and explosions
  - 130 deaths and 800 injuries since 1980
- Regulatory agencies oversee baghouses to ensure air quality
  - Over 500 administrative penalty cases
  - 100 judicial enforcement cases
  - Penalties often exceed $1 million per incident
- Industries that use baghouses:
  - Stone & Cement, Steel, Power, Mining, Chemical, Waste, Food, Pharmaceutical



Shaker



Reverse Air



Pulse Jet

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Legacy Baghouses



Typical Baghouse



Baghouses Require Frequent Maintenance and Inspection

- Existing analog systems make maintaining baghouses challenging
- Regulatory audits can be cumbersome due to lack of historical data
- Failures can persist for weeks or months without notice, increasing potential fines and safety risks
- Manual inspection of analog systems is labor intensive
- Production line efficiency can be impacted
- Energy is wasted

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Retrofit Magnehelic Gauges and Flow Meters



Analog Magnehelic Gauge



Wireless Magnehelic Reader



Airflow Meter



Wireless Transducer Reader

- The Wireless Magnehelic Reader (WMR) is a version of our Wireless Gauge Reader (WGR) for Magnehelic gauges
- The WMR combined with the Wireless Transducer Reader (WTR) access the data in existing Magnehelic gauges and flow meters
- The WMR and WTR provide data for central monitoring and alarming of baghouses
- Trend data helps maintenance teams identify issues before failures occur
- Alarms can be set to avoid catastrophic failure
- Historical data can be used to verify compliance making audits faster and easier
- Integration with existing systems can close control loops for more efficient operations

Baghouse Monitoring Solution Benefits

EPA Compliance	• Faster and easier audits • Avoided fines and penalties
Safety	• Avoided fires and explosions (fewer injuries and deaths) • Avoided air quality issues • Reduced exposure to heights (to read analog gauges)
Maintenance	• Fewer trips to read Magnehelic gauges • Less frequent replacements due to longer bag life • Preventative maintenance instead of emergency maintenance
Production	• Avoided production line downtime caused by the baghouse
Energy	• Minimum CFM wasted from broken bags • Minimum CFM wasted from clogged bags or a failed pulse jet cleaning system

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Baghouse Monitoring Solution
Provides Data and Alarms to Avoid Failures



Legacy gauges and flow meters on baghouses

DATA



Clean-on-Demand
$\Delta p = 8$ in. H_2O

MAINTENANCE





Dashboard and email/text alarms

Δp Reading	Alarm	Possible Faults	Potential Issues
7 in. H_2O		• None	• None

9 in. H_2O		• Pulse jet cleaning system malfunction
		  • Broken diaphragm
		  • Defective electrical components
		• Clogged filter bags
			• Increased fire/explosion hazard
			• Shortened filter bag lifespan
			• Wasted compressed air usage
			• Production downtime

2 in. H_2O		• Leaks in filter bags
		• Filter bags worn out
		  • End of lifecycle
		  • Material defect
			• EPA non-compliance of Clean Air Act
			• Detrimental to filter bag lifespan
			• Wasted compressed air usage

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