

Per L'Italia:

BAGGI S.r.l.

Viale Campania 29 - 20133 Milano
info@baggi.com - tel. 0039 02 715547

Auburn FilterSense

Company Overview



Particulate Monitoring and Control Solutions

Auburn FilterSense

Company Intro

auburnTM SYSTEMS

- Globally recognized as the first company to develop a triboelectric (particle charge) particulate monitoring instrument and establishing the market and applications
- Particulate emissions, filter leak detection, powder/solids flow, ambient dust detection

FilterSense

- Advanced charge based particulate monitoring with the development of sensing mainly via induced charge vs charge transfer by contact and the use of fully insulated sensing probes
- First company to develop intelligent filter DP control and real-time filter diagnostics for all types of baghouses and dust collection systems

Auburn FilterSense

Company Intro



Two globally recognized brands
with over 75,000 units sold



Unmatched market intelligence
and application knowledge



Decades of management and
technology experience



Auburn 40 years in business,
FilterSense 20 years,
employees 30



Technology and market share
leader with differentiated
strategy from competition



70% sales to end users, 30% OEMs
Majority US, direct sales team and
~30 channels globally

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Products and Solutions

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Products



Particulate Monitors

- Stack measurement (mg/m^3)
- Filter performance analysis
- Basic filter leak detection
- Ambient dust monitoring
- Powder flow/no flow
- Other: non-clogging DP transmitter



Intelligent Filter Controls

- For baghouses and cartridge dust collectors
- Intelligent DP/cleaning Control
- Real-time diagnostics
- Locate filter leaks, failed solenoids and diaphragms

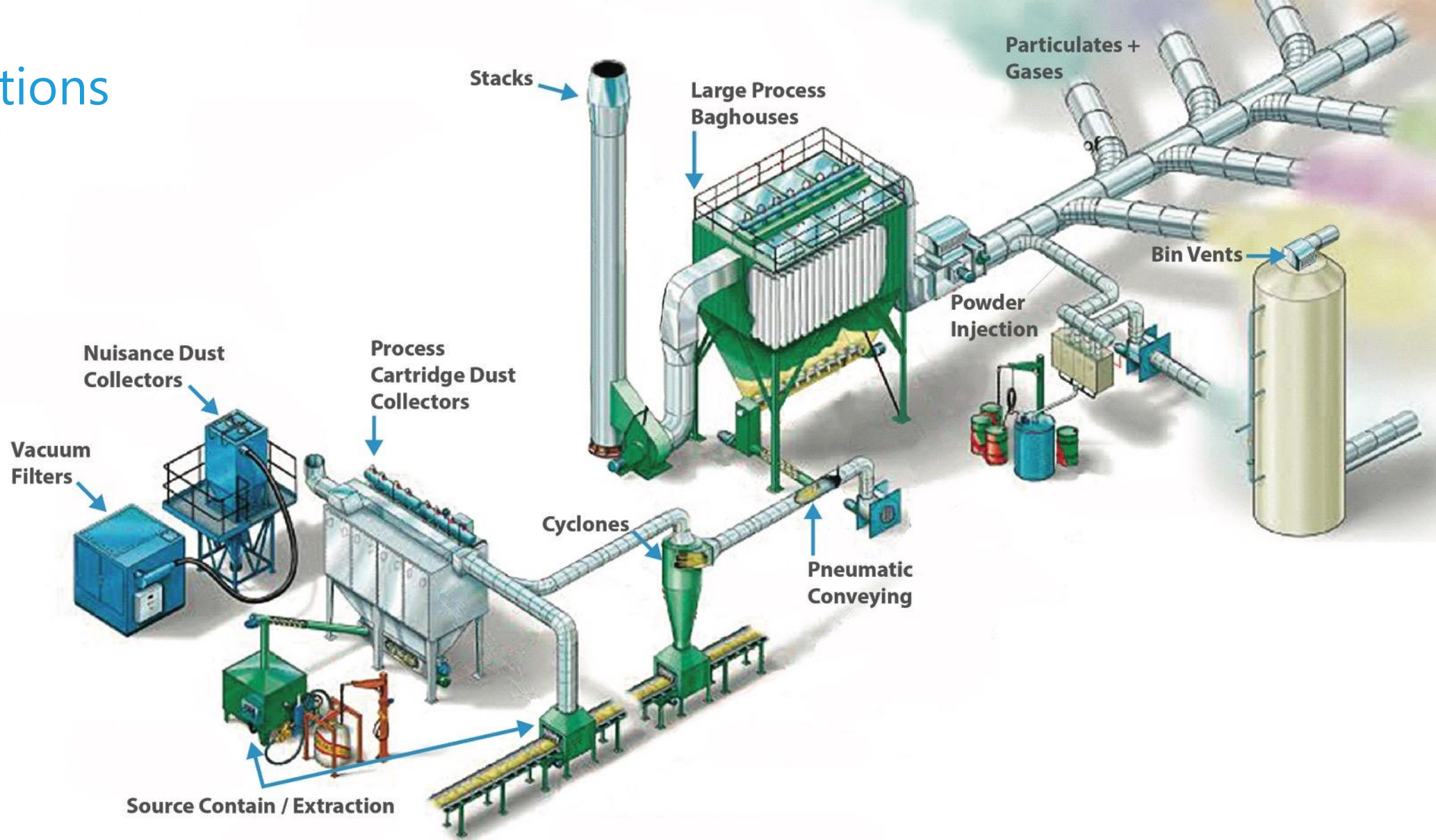


Engineered Systems, Software, Services

- Automation controls and plant systems integration
- HMI/SCADA/Reporting software
- Onsite commissioning, remote device and data support

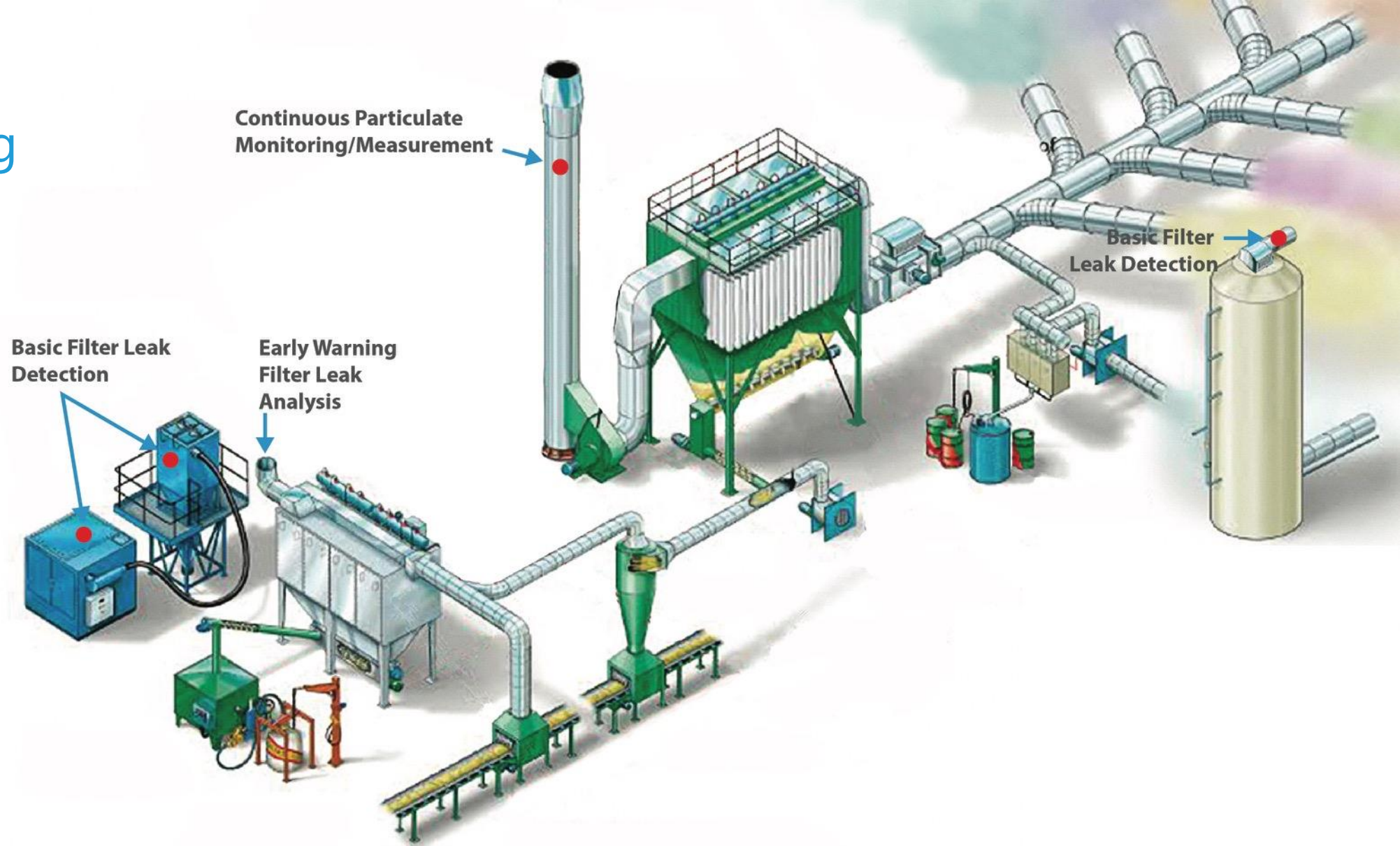
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Applications



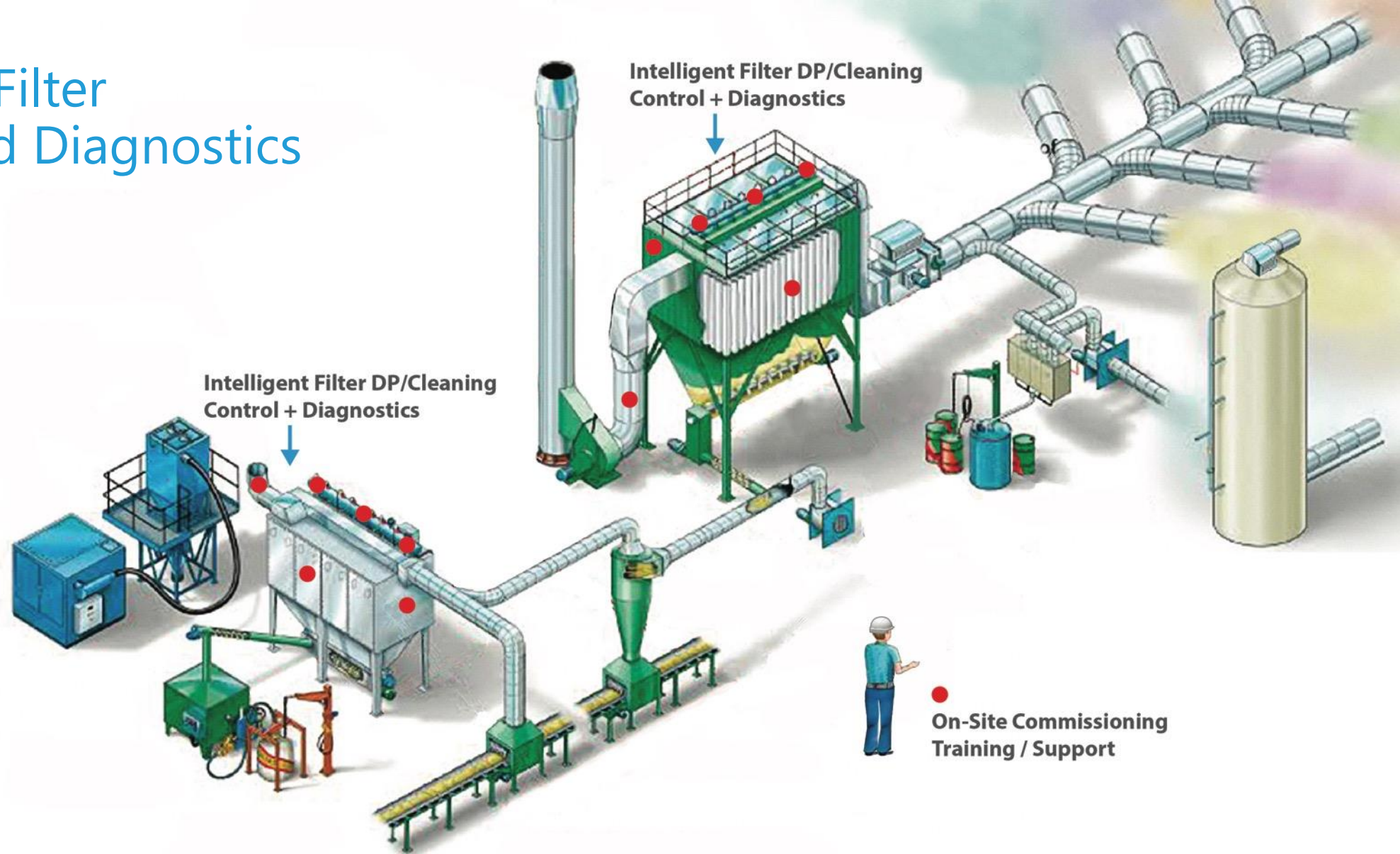
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Particulate Monitoring



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Intelligent Filter Control and Diagnostics



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Process / Plant Wide Systems & Software

Remote Factory
Support / Analysis

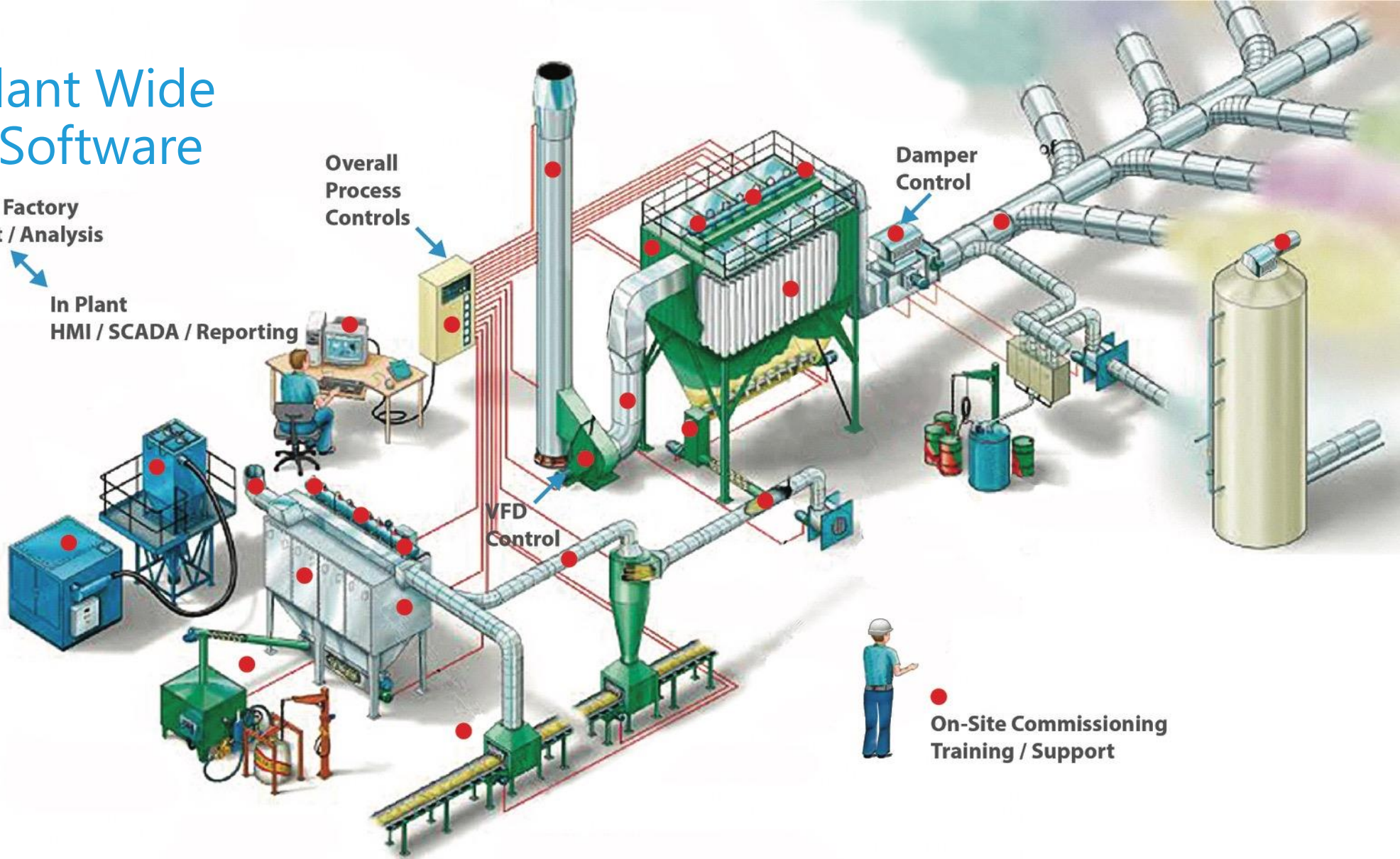
In Plant
HMI / SCADA / Reporting

Overall
Process
Controls

Damper
Control

VFD
Control

On-Site Commissioning
Training / Support



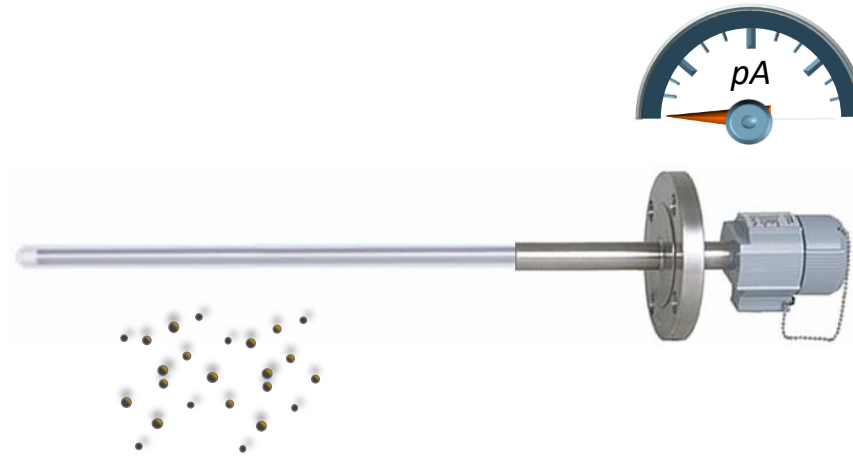
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Our Technology

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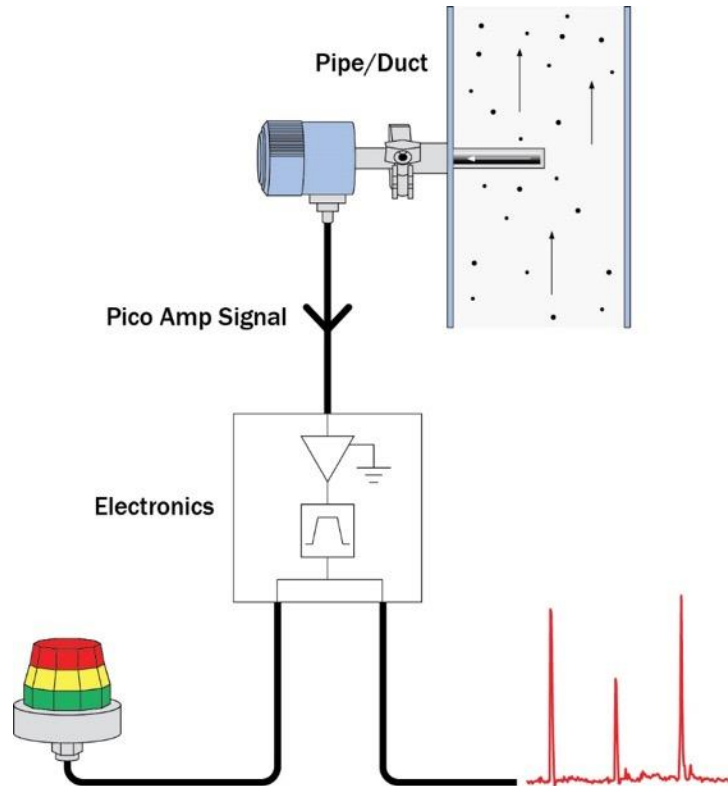
DynaCHARGE™ Technology

- Probe Installed in Duct/Pipe
- Charged Particles Flowing Over Probe Induce a Charge
- Induced Charge is Processed Into Output Signal ($\text{pA} = 10^{-12}$ amps)
- Linear Output Signal is Proportional to Mass



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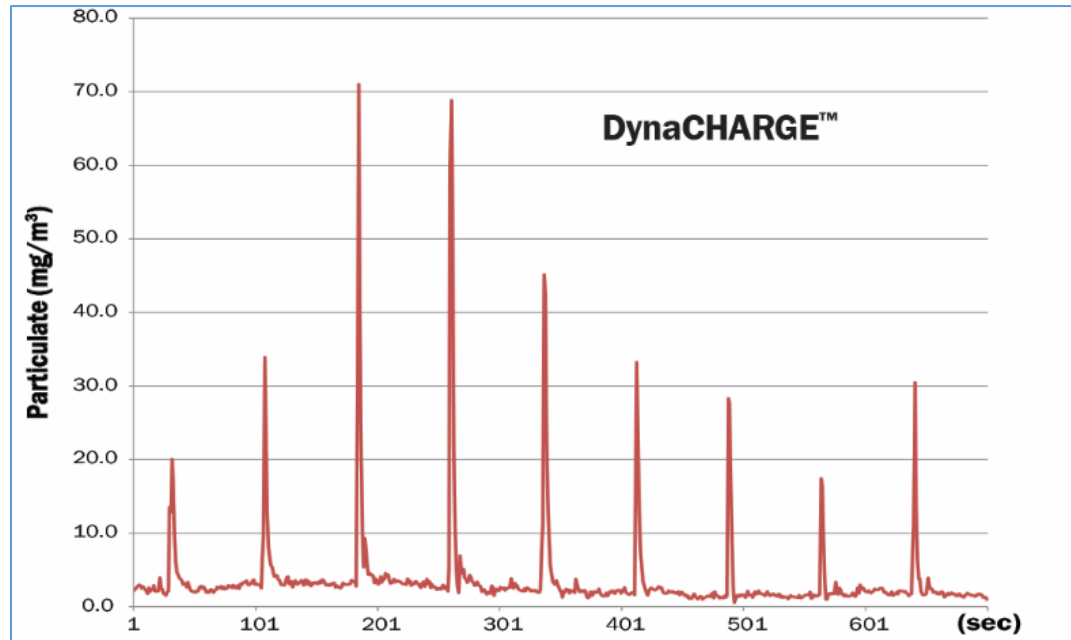
Particulate Sensing Technology



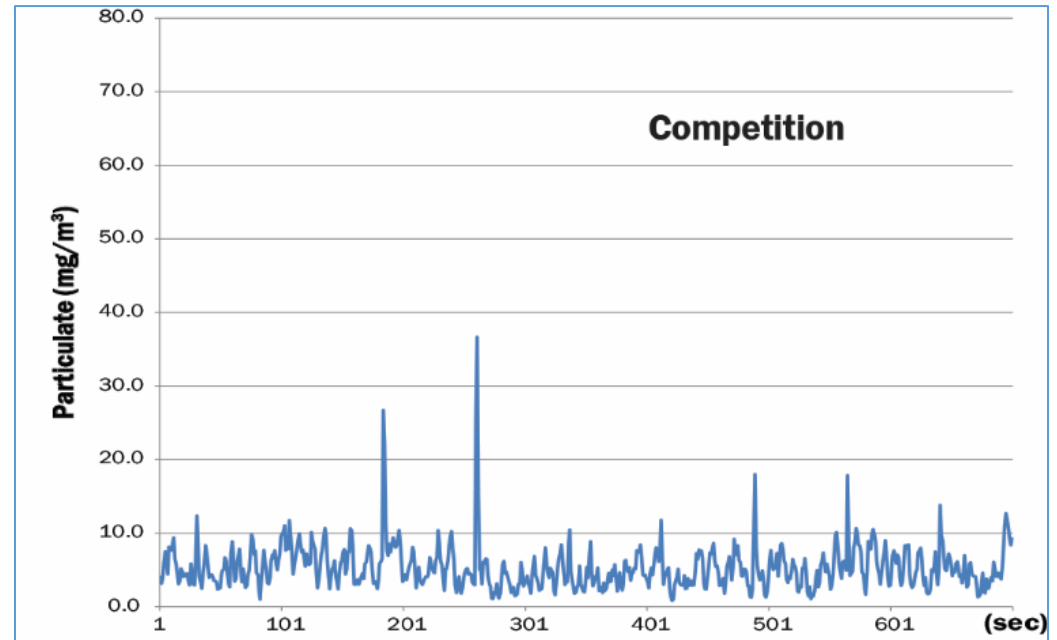
- An electrically isolated probe is inserted into a pipe/duct/stack
- Particles flowing over the probe transfer charge by contact and induction
- The charge flows through the circuit to ground, this is a small current (in the pico amp range 10^{-12})
- Particle charge is related to the mass of particles
- The signal is analyzed over a range of frequencies and processed into an output linear to mass
- Precise electronics, advanced signal processing and fully insulated probes enable accurate, low-level measurement in harsh applications

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DynaCHARGE™ vs Competitive Charge



- High Resolution (from high signal to noise ratio)
- Rapid Response with wide Dynamic Range
- Low Level Measurement and Linearity



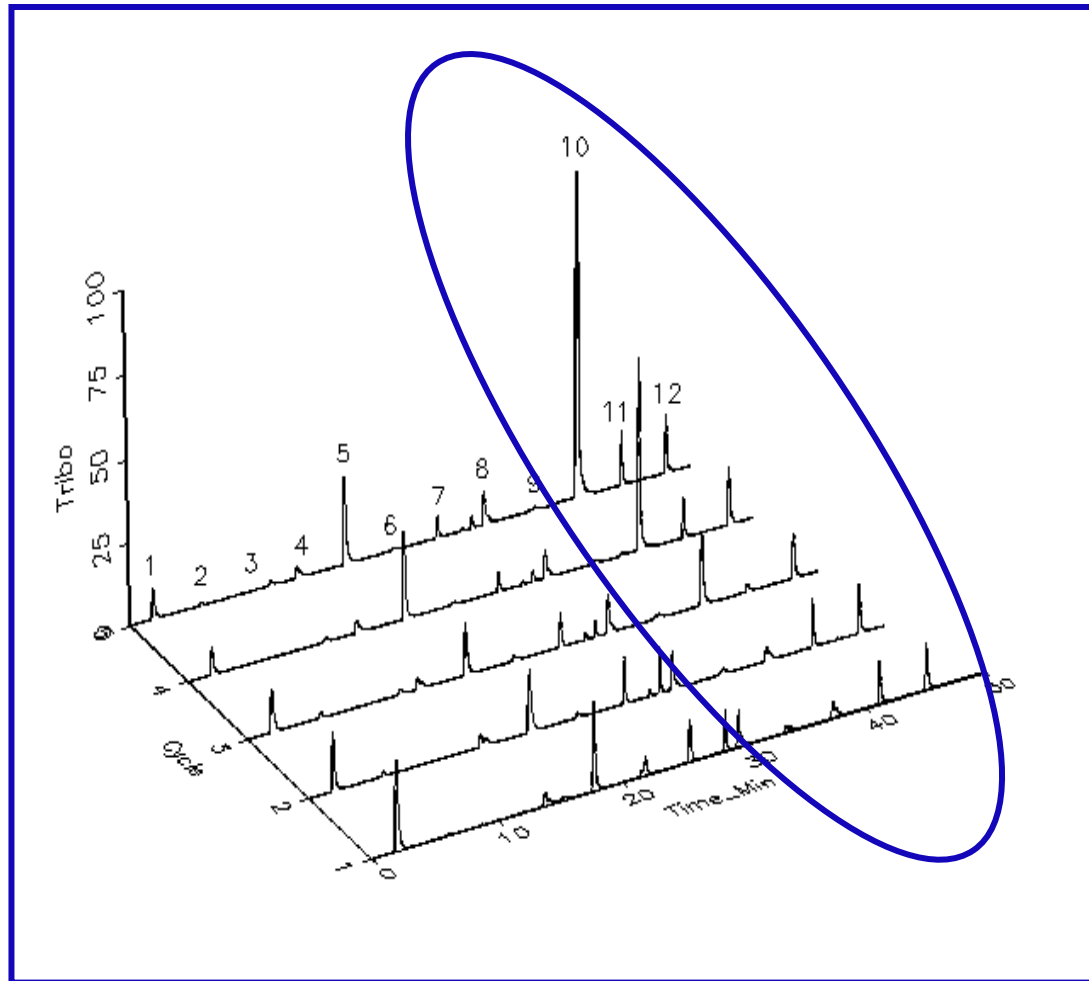
- Mid Priced Competitive AC Tribo
- Noisy Base Line with Zero Offset
- Poor Resolution and Linearity

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Triboelectric/Dynacharge vs. COMS

- *Small spikes represent elevated emissions from a normal cleaning cycle*
- *Large spikes indicate leaks from torn filters. A pencil -sized hole was detected in seconds*
- *The optical sensor was unable to detect a leak until the tear grew to 8"*

Source: Aluminum Reduction Facility Saves \$200,000 Annually
http://www.auburnsys.com/PDFs/Aluminum_Case_Study.pdf

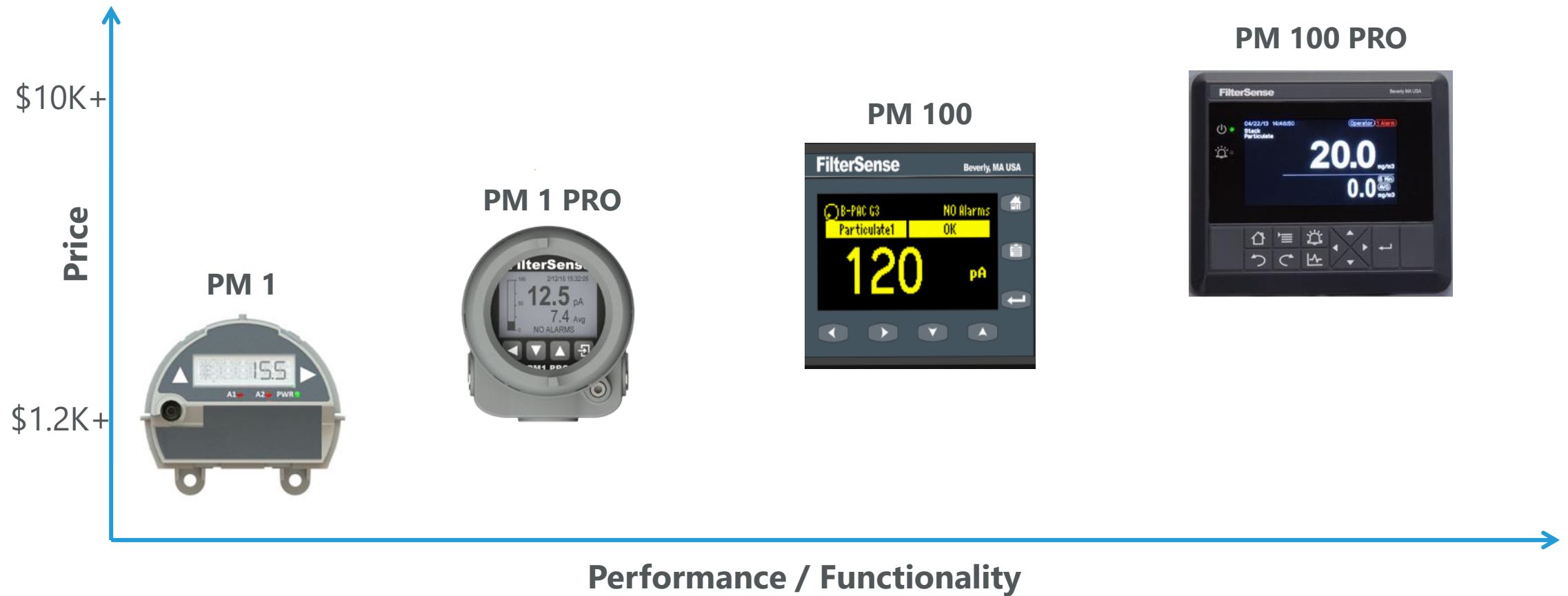


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PM Series Monitors

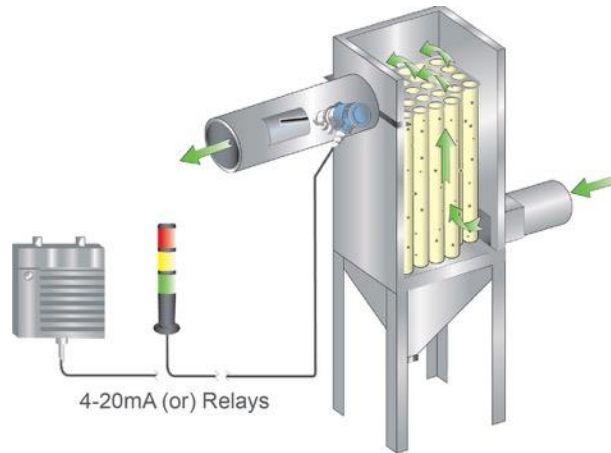
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Particulate Monitoring Product Range

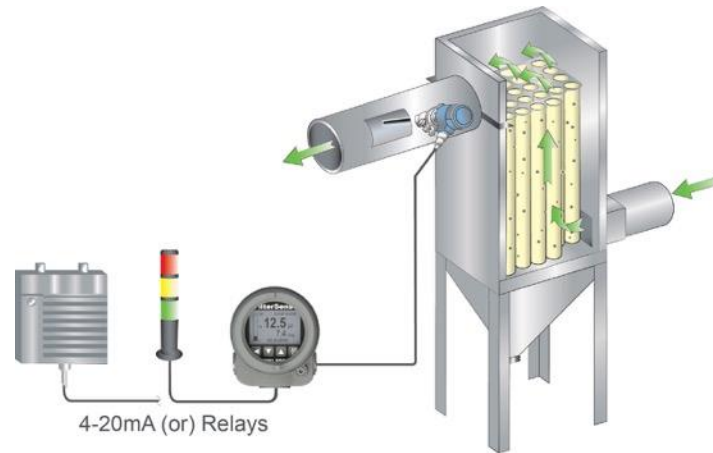


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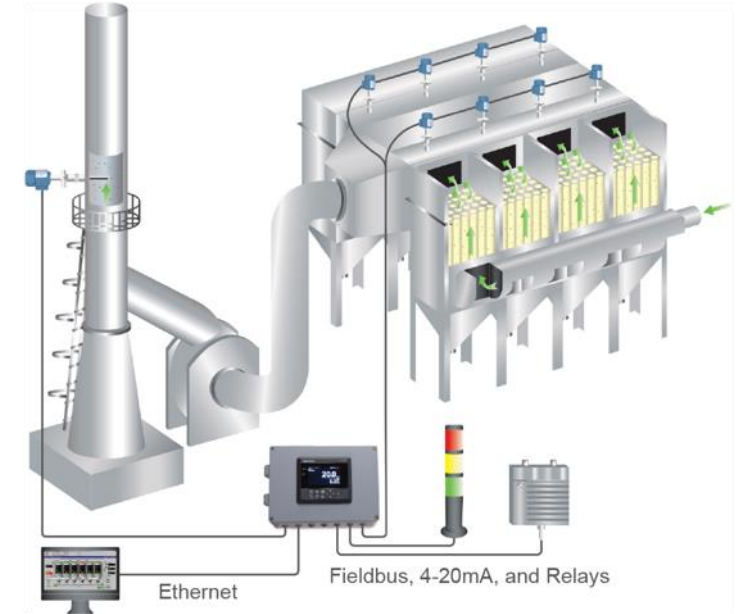
Particulate - Model Applications



PM 1 basic



PM 1 PRO



PM 100 PRO

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DynaCHARGE™ PM 1 Series

Features:

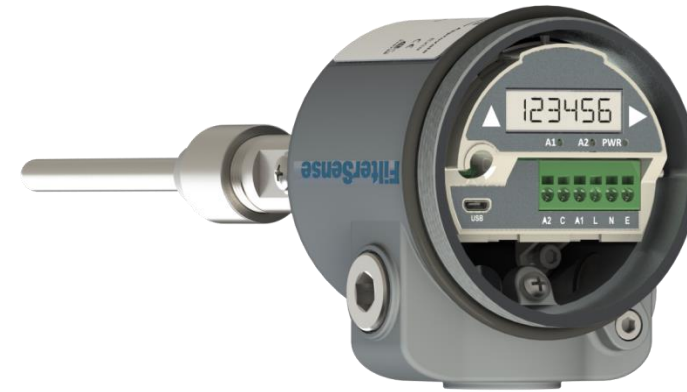
Single Point Monitoring

- Industry Benchmark in Reliability
- Flow / Leak Detection
- Easy Use & Installation
- Option for Loop / Line Power
- Low Cost

Superior Performance

- Absolute Output
- No Confusing Adjustments or Calibrations
- Dependable Alarms

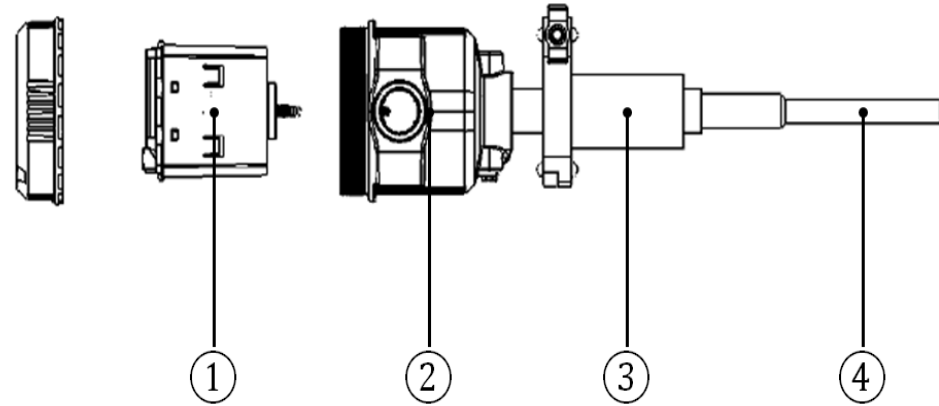
“Market Leader for Basic Applications”



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Filter Leak Detector – PM 1 Basic FLD

- ① Electronics Module
- ② Electronics Enclosure
- ③ Process Mount
- ④ Sensing Probe



DynaCHARGE Product Range

- *PRO Models*
 - PRO models have value-added features for process control, harsh conditions, and EPA Compliance
 - True zero and span self-tests that automatically allow the determination of calibration drift at the zero and high-level values
- *Basic Models*
 - The basic models offer a lower price yet still provide essential functions and core FilterSense advantages.

DynaCHARGE™ PM 1 PRO Series

Features:

Single Point Monitoring

- Industry Benchmark in Reliability
- Flow / Leak Detection
- Easy Use & Installation
- Option for Loop / Line Power

Superior Performance

- Absolute Output
- No Confusing Adjustments or Calibrations
- Dependable Alarms

“Market Leader for Basic Applications”



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Filter Leak Detector - PM 1 PRO – Base Unit

Transmitter (4-20mA), 2-Wire Loop Power	PM 1 PRO-T
Alarm (2 Relays), Universal AC/DC (20 to 250 VAC/VDC)	PM 1 PRO-A
Alarm and Transmitter, Universal AC/DC (20 to 250 VAC/VDC) (2 Relays and 4-20mA Output)	PM 1 PRO-AT

Secondary Output

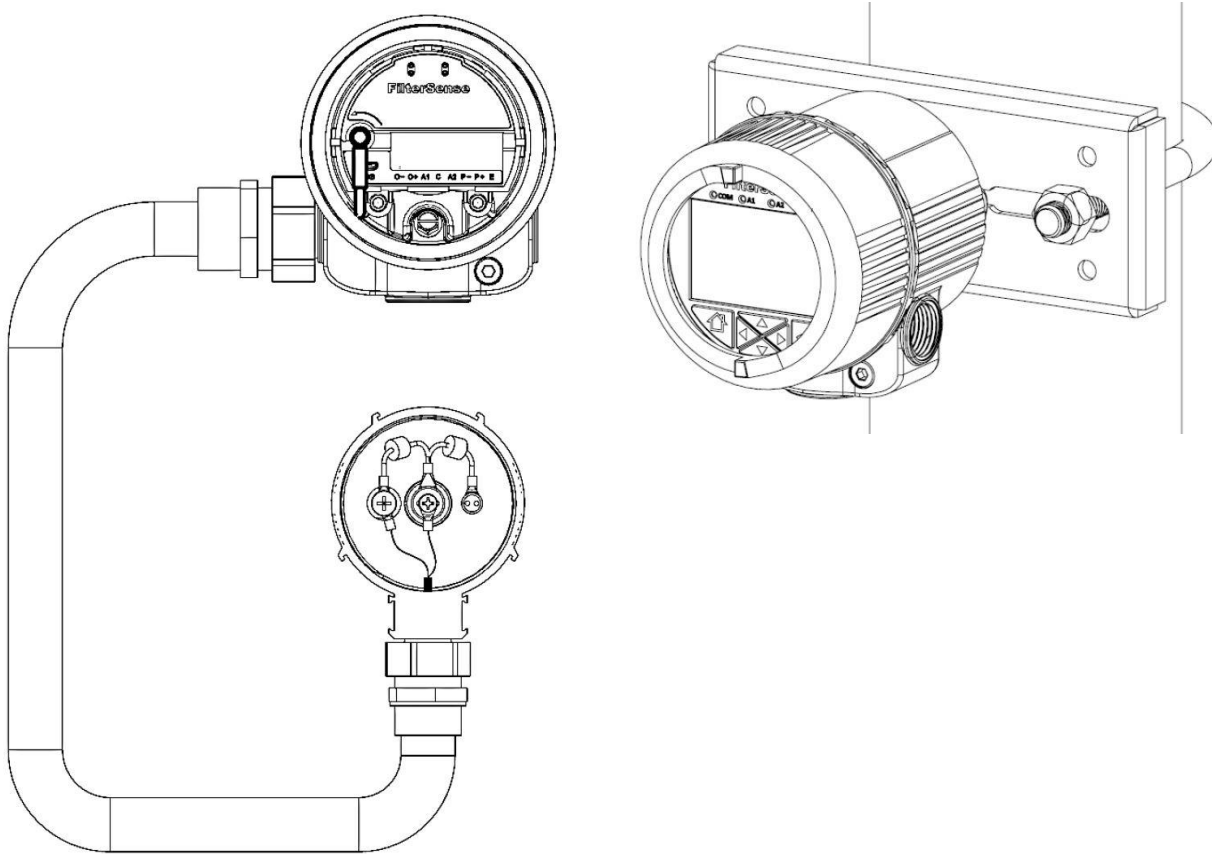
Bluetooth with DeviceLINK PRO Andriod/IOS App	BT
HART with Device Specific DTM software and DD file	H
Wireless HART (Requires H)	W
Wireless HART with Battery Power (Requires H)	WB
Modbus RTU (Serial RS-485)	M
Profibus DP (Serial RS-485), Pending Release	P

Functionality

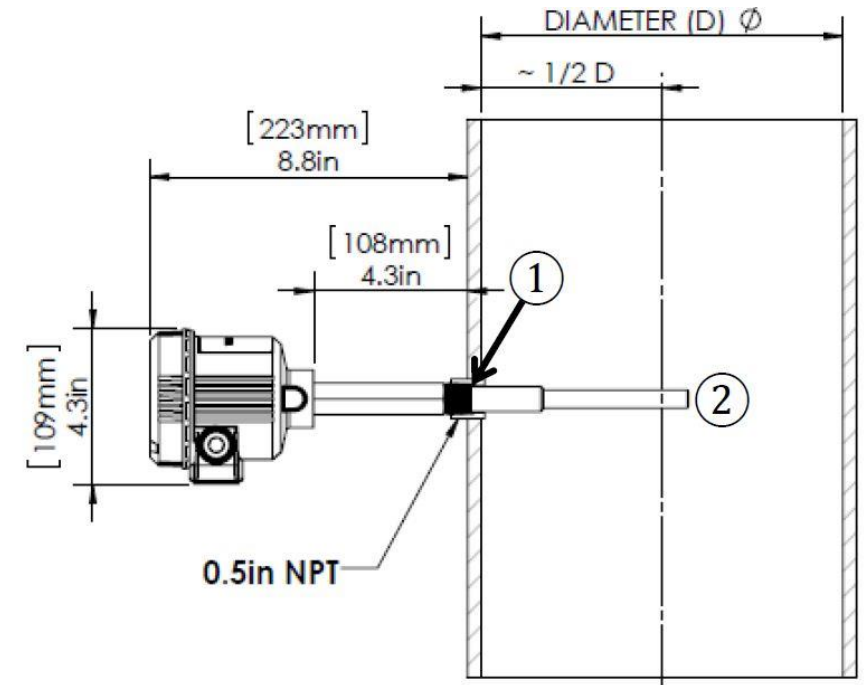
Device Diagnostics (to Namur NE 107)	K
Automatic EPA Self-Tests (Requires K)	L
Basic Internal Data Logging	B

DynaCHARGE PM 1 PRO Electronics Version

Remote Electronics (2-Piece Device, Req. PS 10 Sensor)

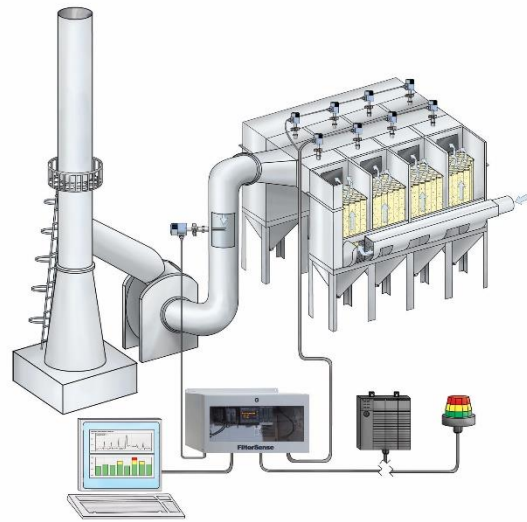


Integral Electronics (1-Piece Device)

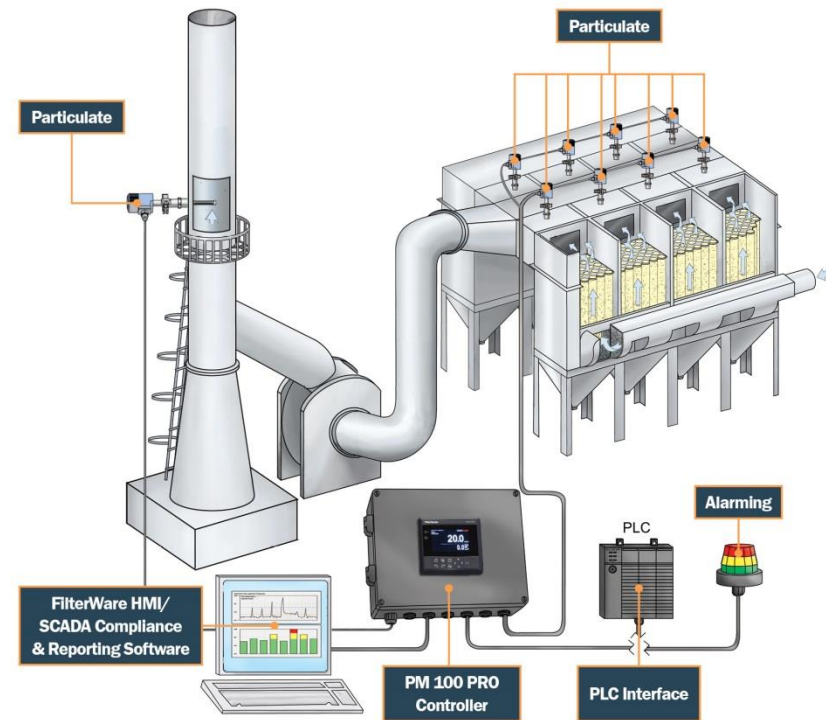


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Multi-Channel PM 100



PM100
Particulate Monitoring System



PM100 PRO
Advanced Particulate Monitoring



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Multi-Channel Particulate Monitor MICS Platform Modularity

Features

- Choice of Certified Fieldbus
- Easy Expansion
 - Scalable Performance & Function
- Simplified Service
 - No Back Plane
 - Easy In
 - Easy Out Modules



EtherNet/IP™



ControlNet™

DeviceNet™

EtherCAT®

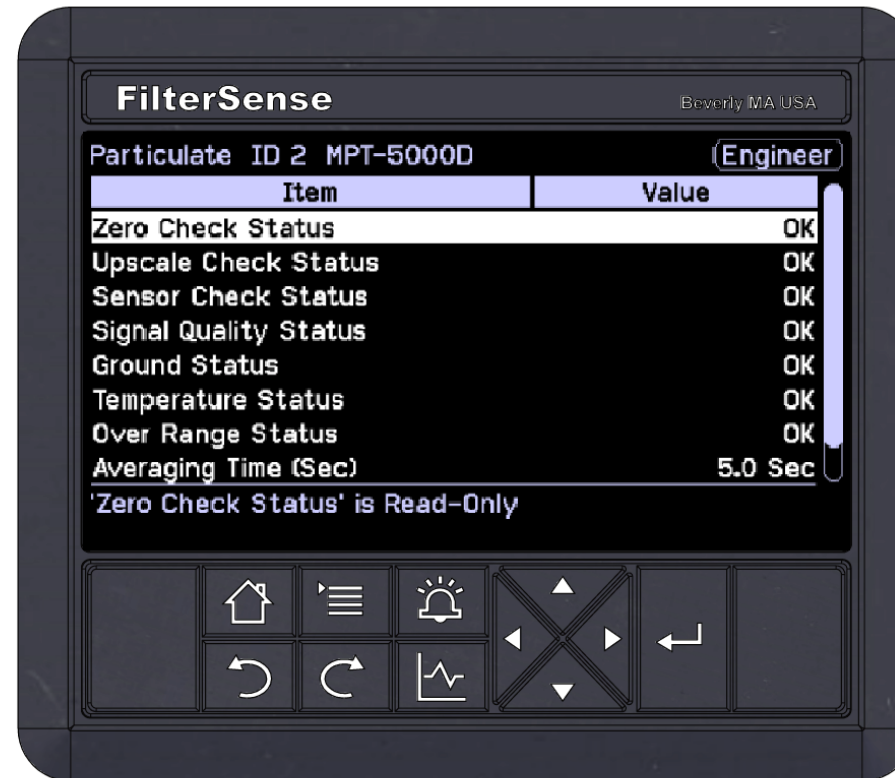
CANopen®

CC-Link®

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PM 100 PRO Self Tests/Diagnostics

- Zero Check
- Span/Upscale **and Linearity**
- Sensor check
 - Wiring, insulator fouling, water in housing etc.
- Continuous/Real-Time System Checks
 - Earth Ground Check**
 - Signal Quality/Sensor Condition Analysis
 - Signal Over Range
 - Electronics Temp Check
- Access at control unit, signal processing module, and over fieldbus
- Easily set time of day and frequency of periodic checks –checks run in ~60 seconds total



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B-PAC Systems

Baghouse Performance & Analysis Controls
for Pulse Jet Style collectors

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B-PAC™ Technology

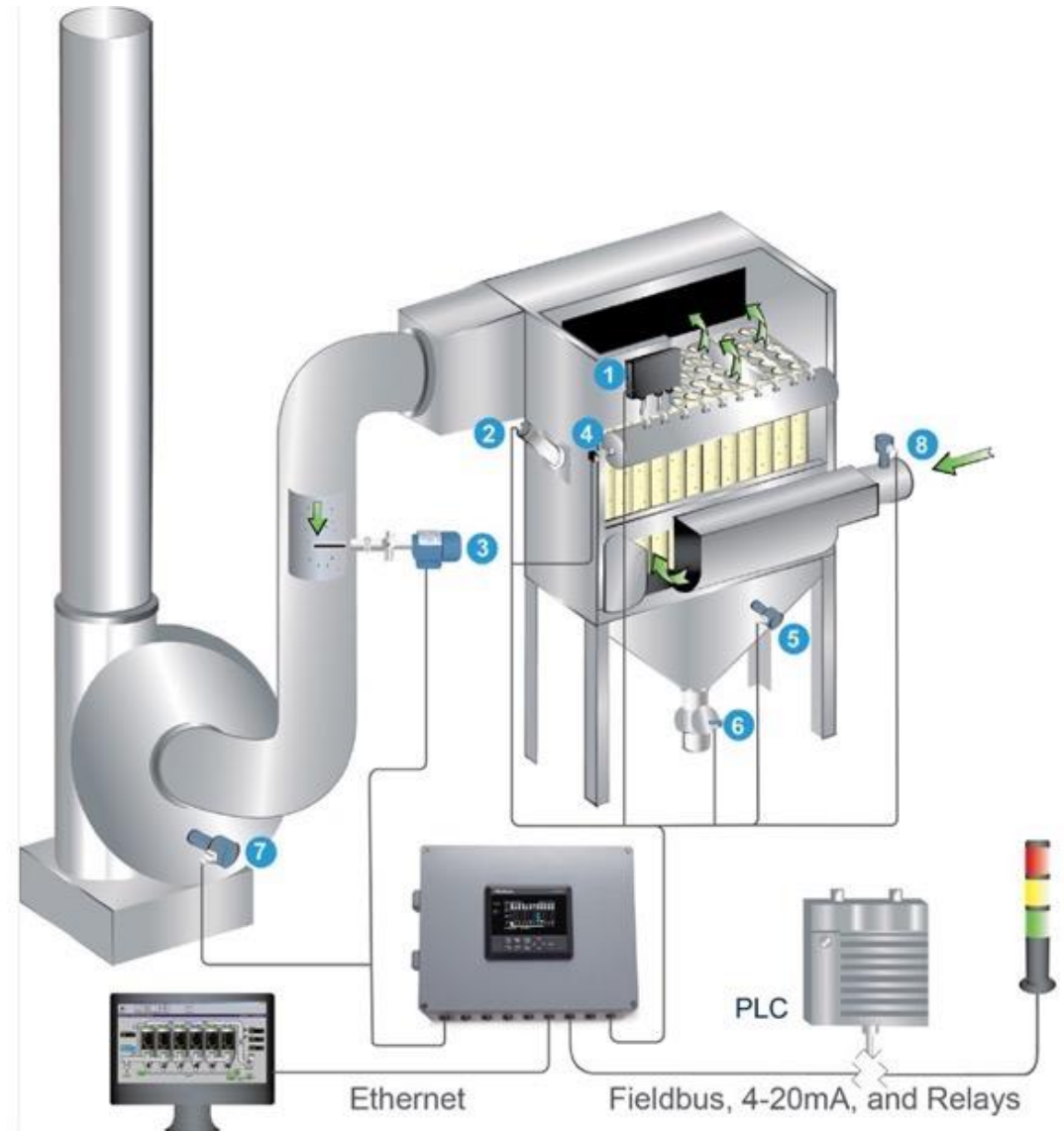
Application specific electronics, digital signal processing of tightly integrated sensors inputs for intelligent control and diagnostic outputs

Primary I/O

- 1. Solenoids/Valves
- 2. DP
- 3. Particulate
- 4. Header Pressure

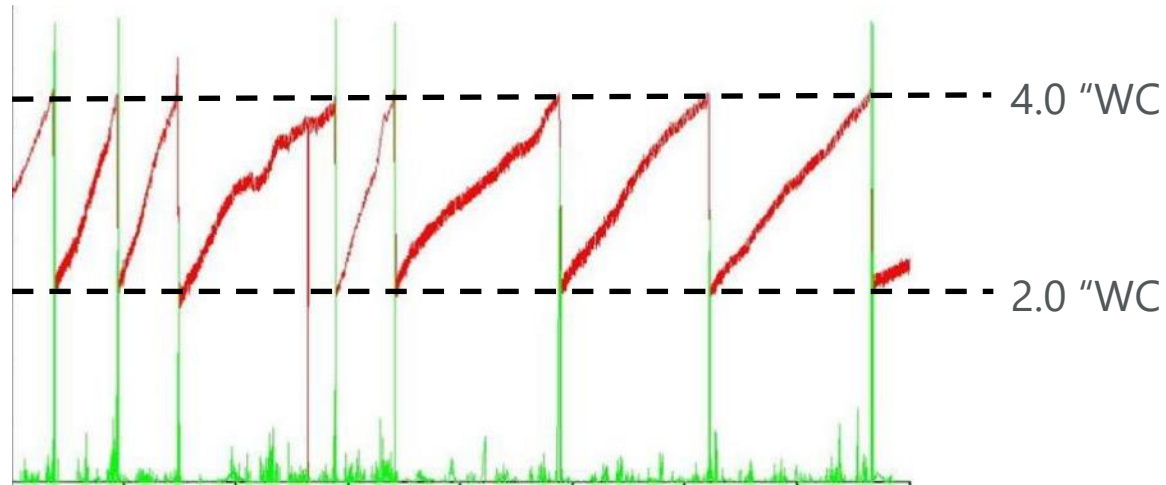
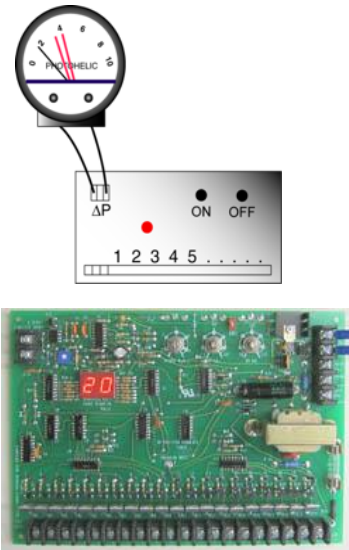
Additional (example)

- 5. Hopper Level
- 6. Air Locks
- 7. Fan Amps
- 8. Temperature



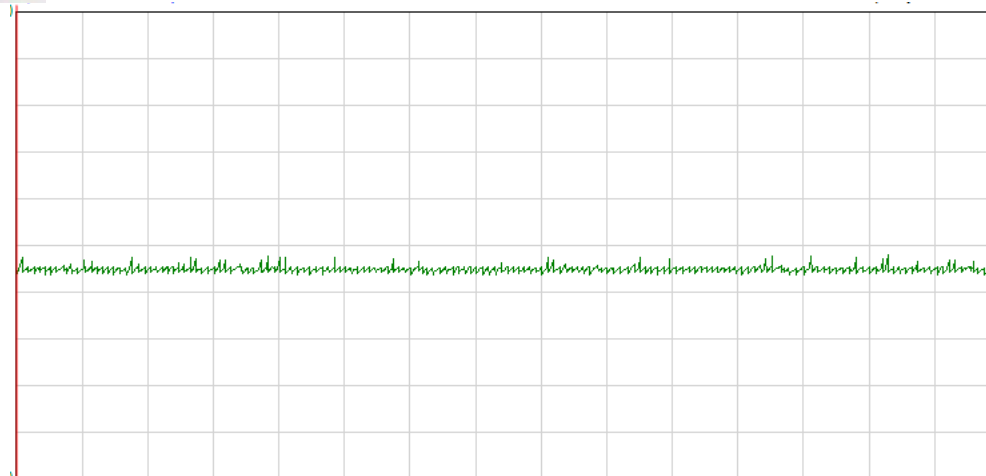
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B-PAC™ - Intelligent DP/Cleaning Control



Traditional Hi/Lo DP control varies especially over varying input loads

IntelliPULSE™



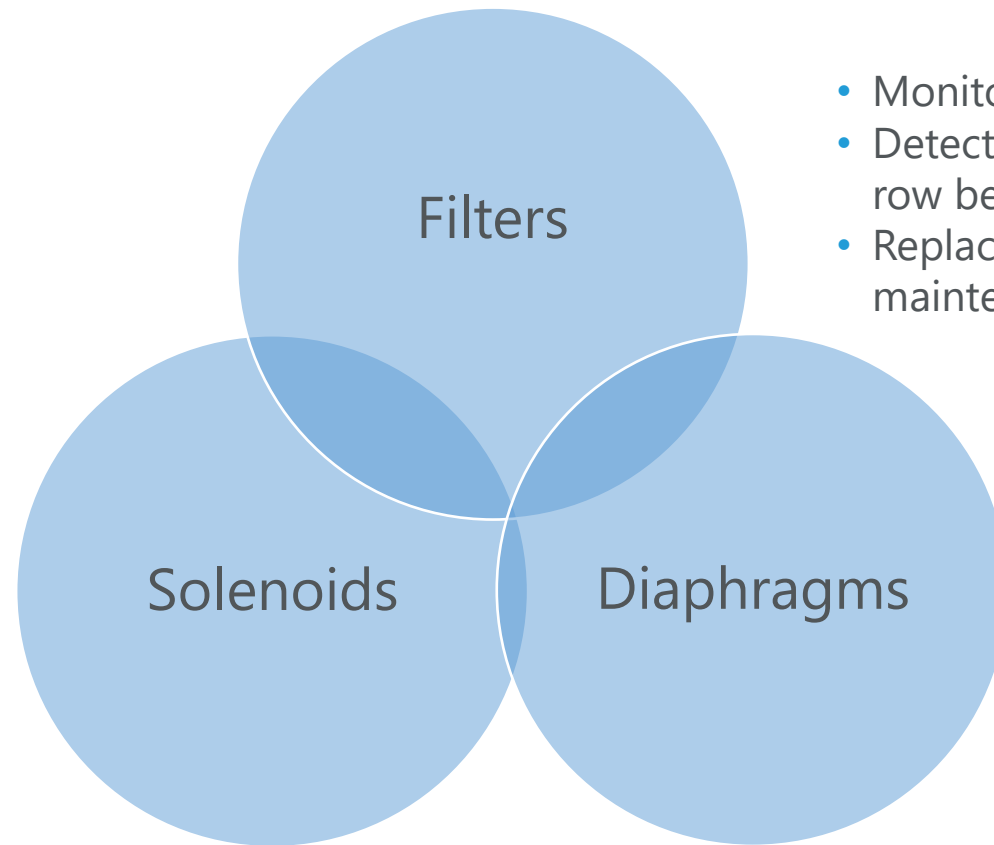
IntelliPULSE™ controls DP over varying dust input load while simultaneously minimizing pulsing

— — — 3.0 "WC, DP held within 0.1 "WC

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Real-Time Condition/Health Monitoring

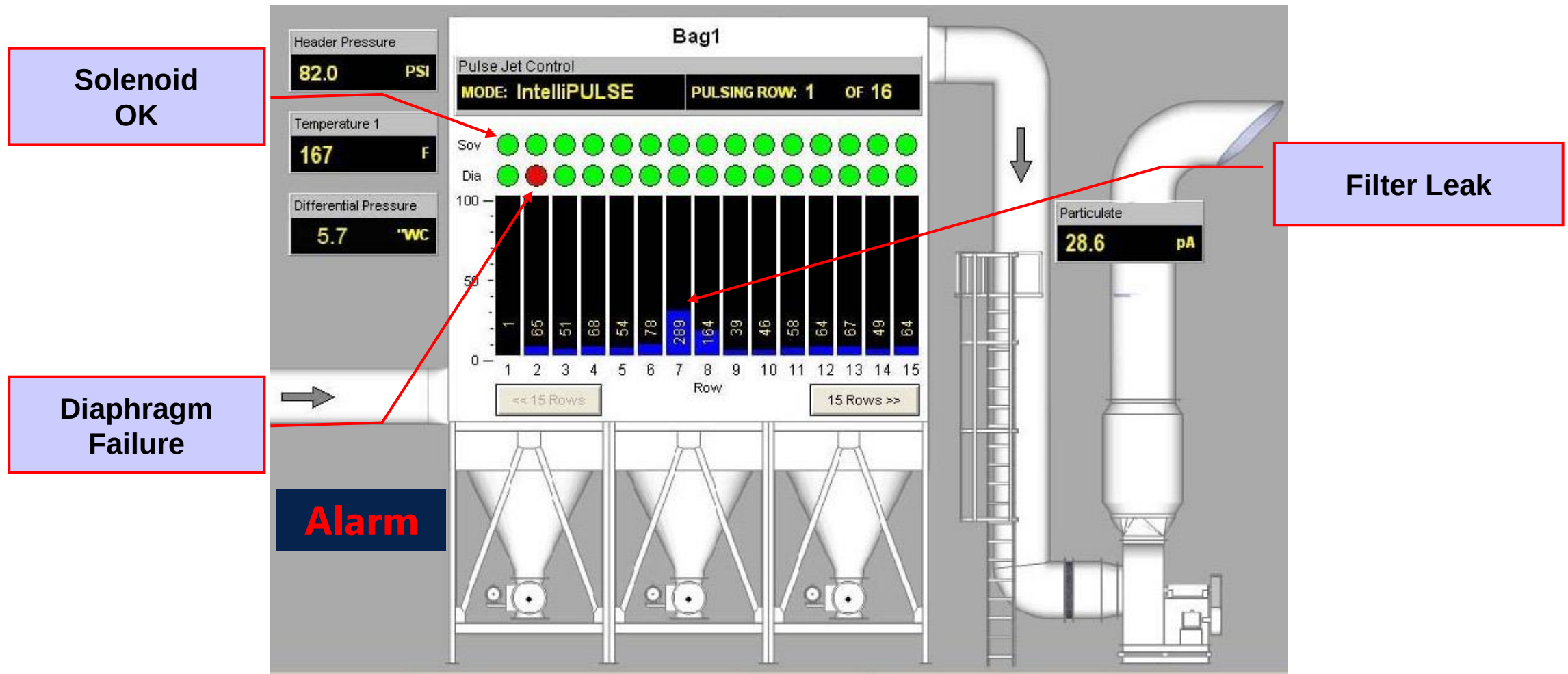
- Instantly detect open and shorted solenoids that cause DP to rise and filters to plug
- Real-time short circuit protection to limit failures
- Available for AC and DC powered solenoids



- Monitor filter condition by row
- Detect and locate developing leaks by row before emissions are visible
- Replace only leaking filters and plan maintenance

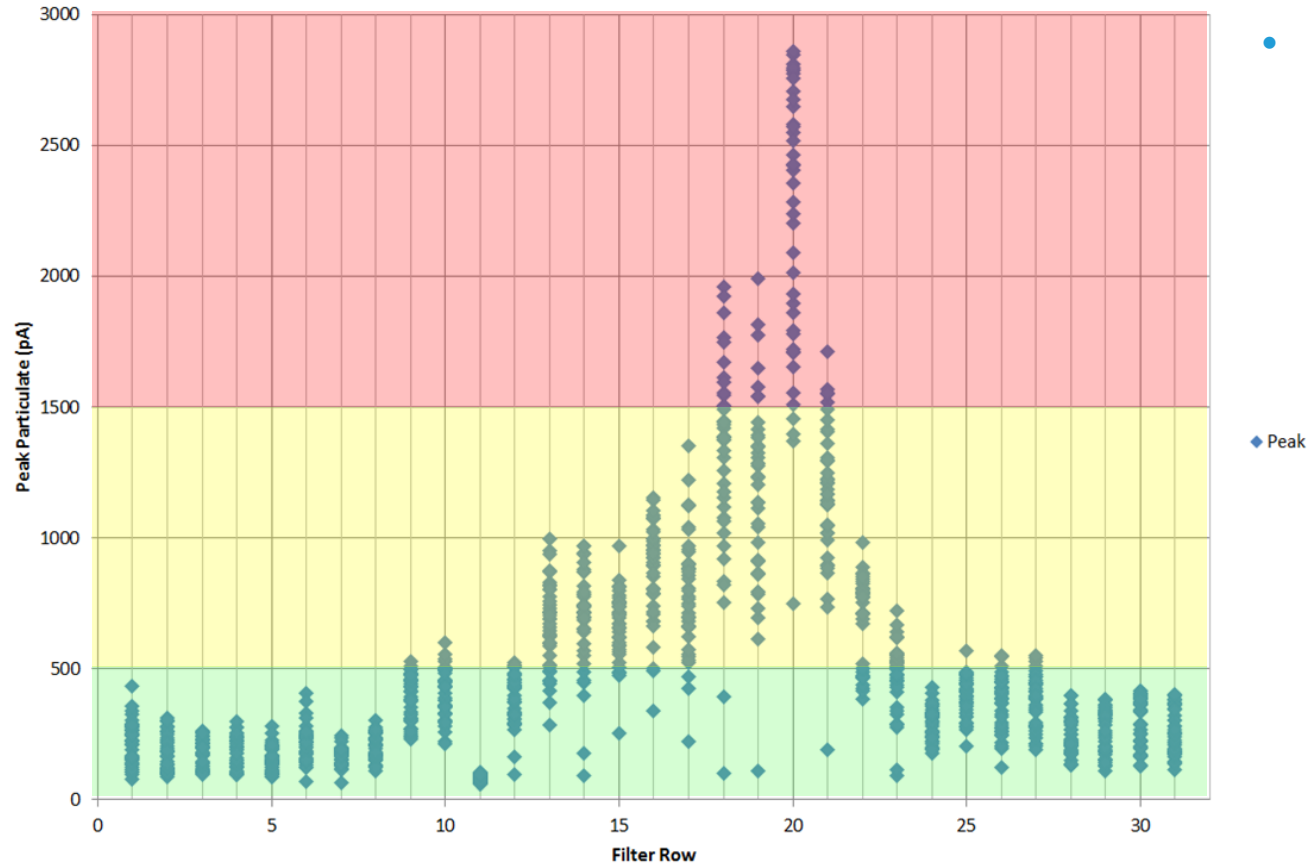
- Instantly detect and locate ruptured, lazy, frozen diaphragms that cause DP to rise and rapidly waste compressed air
- Multi-header tank capability

B-PAC™ - Diagnostics via FilterWARE™ Software



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Example– Filter Leak Locating Data

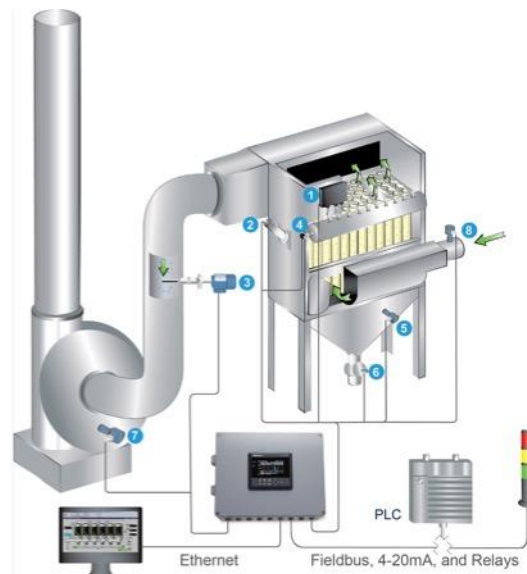


- Chart shows readings from over 40+ cleaning cycles showing progressing filter failure by row

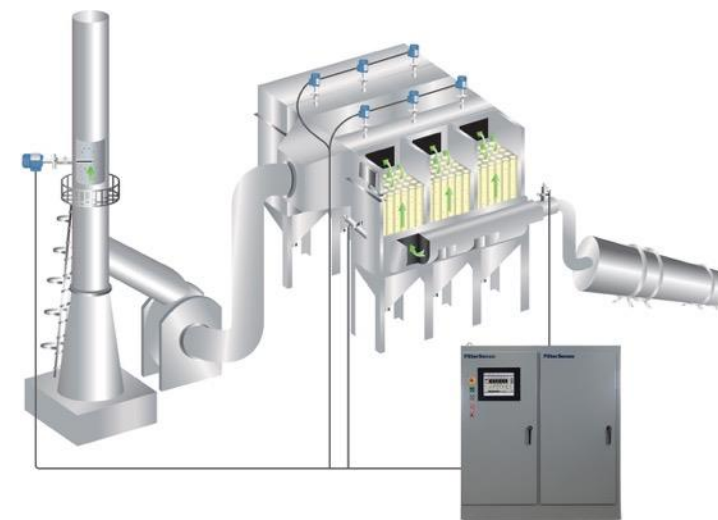
Controls - Model Applications



IP 100



B-PAC



B-PAC PRO ES

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Productivity and Compliance Software

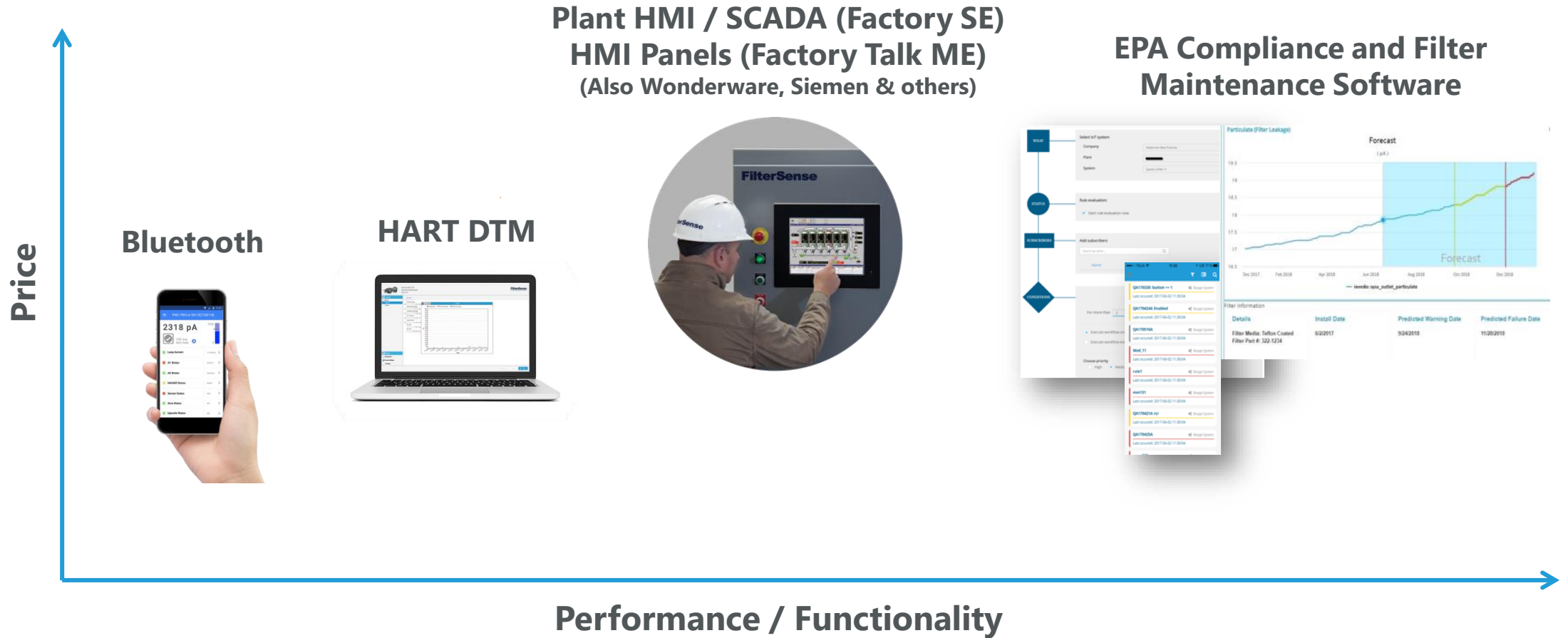
EPA Compliance and Maintenance Services



Particulate Monitoring and Control Solutions

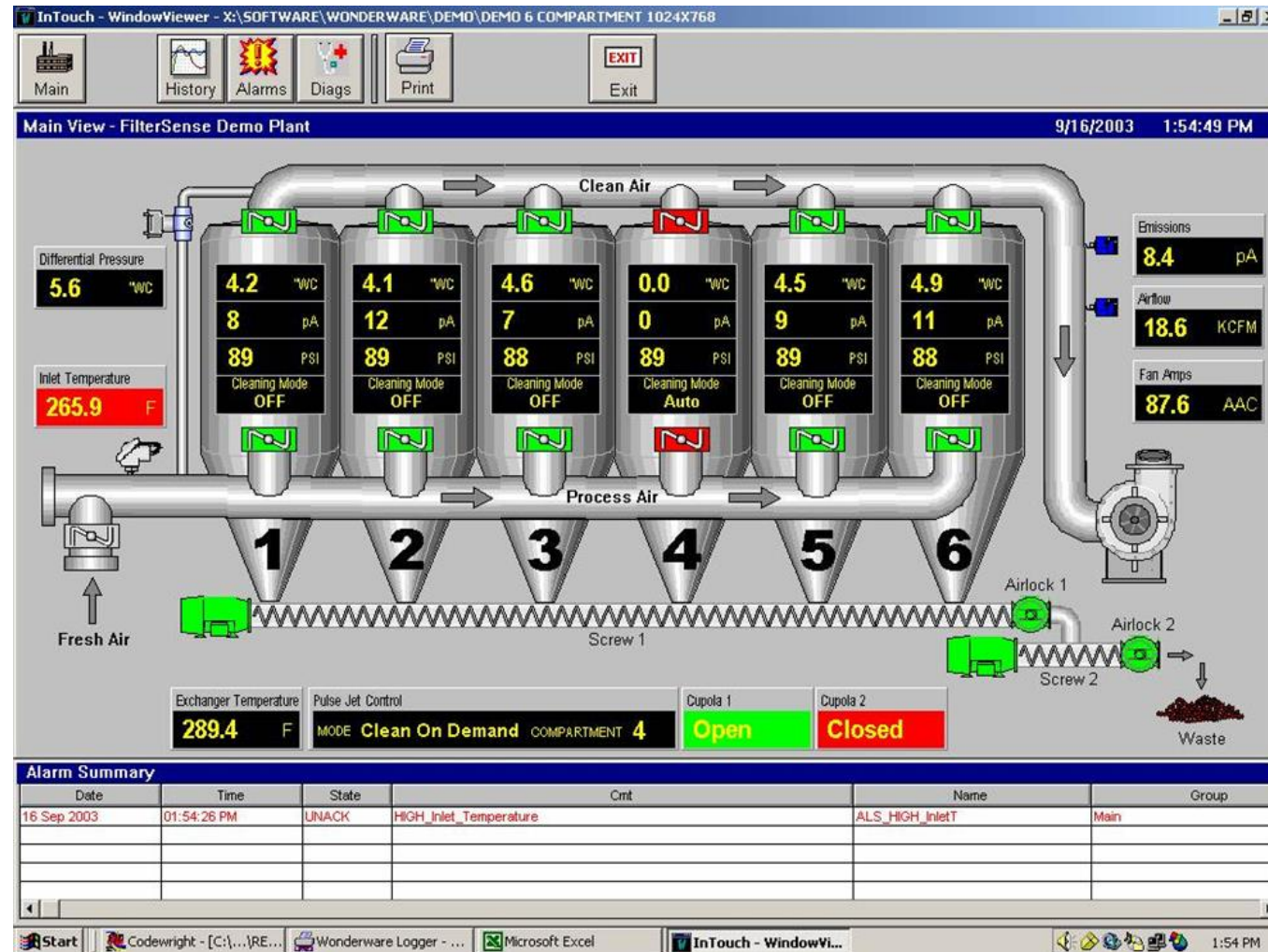
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Productivity, EPA Compliance and Filter Maintenance Software



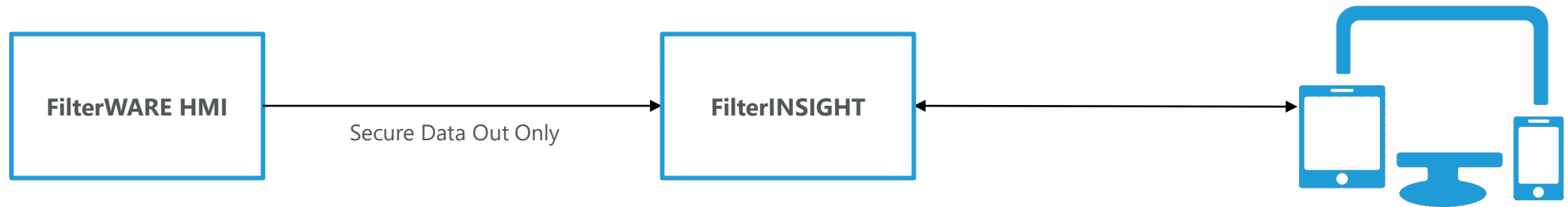
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FilterWARE HMI/SCADA – Advanced Process Visualization and Control



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FilterWARE and FilterINSIGHT Communication



Real-time Monitoring and Control

- Real-time SCADA Database
- Powerful embedded trending
- Device parameter adjustment
- Customized interactive process screens with animated graphics

Advanced Reporting and Mobility

- Automated report generation and distribution
- Multiple dashboard and report configuration packages available
- Advanced analytics and functionality
- Dashboard Designer for easy changes and updates

Access Anywhere

- Alarm alerts via email and mobile app notification
- Corrective Action login
- Monitor readings from any location

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Compliance Assurance and Maintenance Support Services

Compliance Assurance and Maintenance Support Services

(Periodic Data Review or Continuous/connected)



Expert review to Regulations & KPIs
On-Site Technical Inspections
Management of Maintenance



Particulate Monitors
Sensitive
Smart/Self Checking
Measure/Comply



Controls/Automation
Filter Diagnostics
Intelligent Control
Plant Systems Integration



Productivity and Compliance Software
Device (DTM, Bluetooth)
Plant (HMI/SCADA)
Reporting, Mobile, Analytics

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Benefits



Process Control and Optimization

- Control DP/airflow, minimize energy/compressed air use
- Optimize filter cake, prevent loss of valuable powders



Operating and Maintenance Costs

- Eliminate manual inspections, prevent downtime, extend filter life
- Protect blowers, turbines, HEPA's, avoid damage to cars, structure



EPA, Health & Safety (OSHA/NFPA)

- Prevent compliance fines, shutdowns, lawsuits
- Reduce personnel exposure to hazardous PM and spaces
- Ensure hazardous dust pick up, prevent accumulation

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Applications

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Aluminum - Primary Application



Aluminum producer maintains emissions below 1 mg/m³ from a 2.8M CFM process in pristine Iceland

- DynaCHARGE™ outperformed a forward scatter PM CEMS
- Plants monitors leakage by row from 20,000 filters enabling proactive maintenance preventing out of compliance emissions

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Minerals – Calcium Carbonate



SMI Turns EPA Project into \$765K in Annual Operating Savings

and a \$600K energy rebate

- A network of 120 B-PACs™ and a 7 station FilterWARE™ software system was engineered and installed
- Intelligent control and diagnostics reduced costs, lowered emissions and led to a cleaner plant

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Asphalt



DynaCHARGE™ proves to be Reliable Technology for California Air Quality Rule 1155

- Asphalt industry challenged California Rule 1155 on basis that no technology could reliably monitor particulate emissions at hot mix asphalt plants
- A long term test by the state proved DynaCHARGE™ was reliable with virtually no maintenance

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Reliability Engineers Specify and Standardize on B-PAC™ Controls for all Baghouses

- Process upsets caused 9 emergency outages and caused extensive damage
- After installing B-PACs™ the plant reduced costs by over \$40K annually and had no visible emissions or emergency outages

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Buzzi Unicem USA Tackles EPA Compliance, Streamlines Operations, and Reduces Downtime

- At just 10% of the total project cost the B-PAC™ PRO ES system provides advanced control and time/money savings insights
- Unplanned maintenance was reduced from 200 hours to only 14 hours

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Carbon Black



DynaCHARGE™ Handles Tenacious Carbon Black

- For 1.5 years DynaCHARGE™ did not require maintenance
- Competing charge and optical systems required quarterly and weekly maintenance on the same process

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Aluminum - Secondary Application

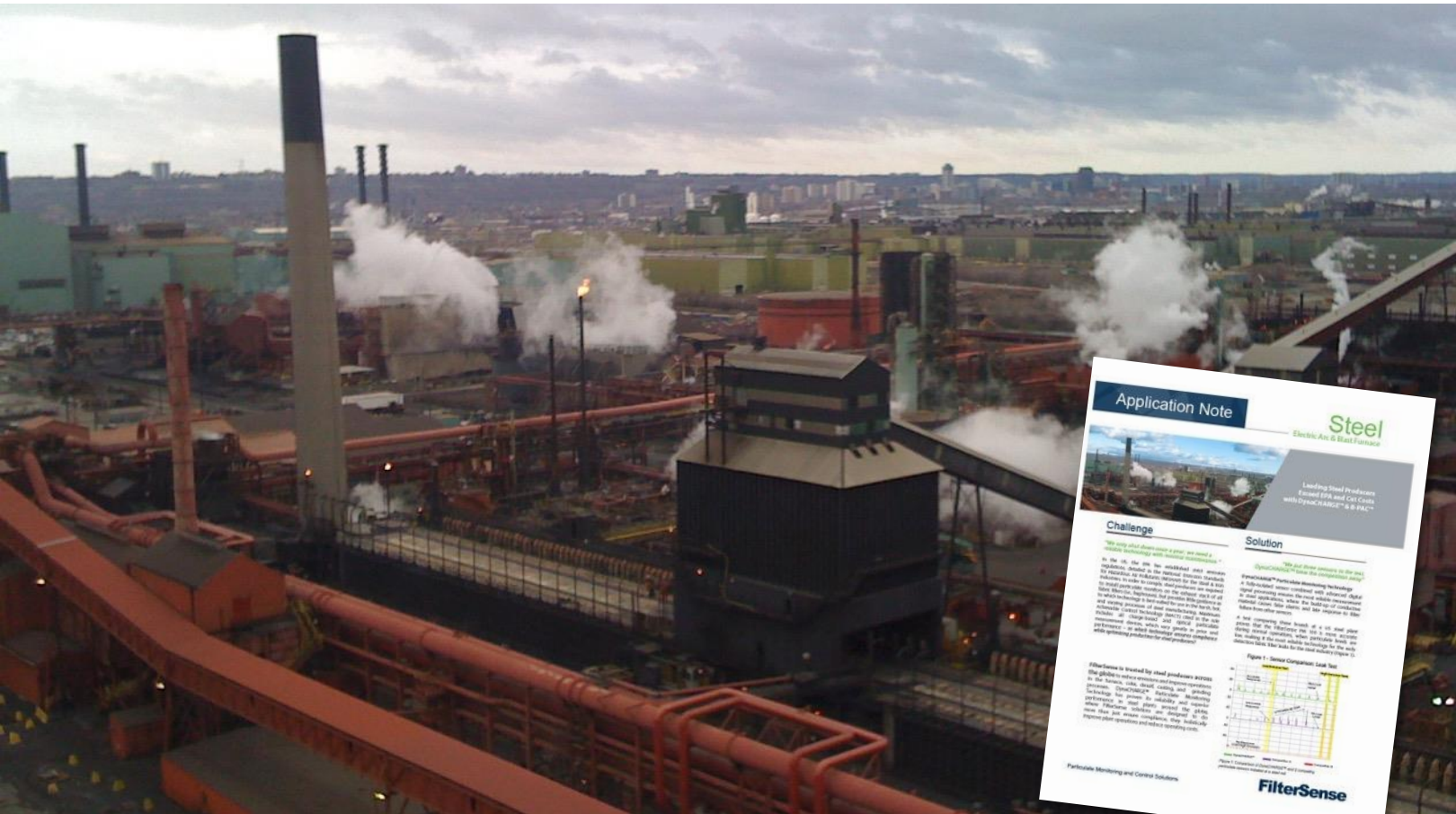


Aluminum Plant Invests in Preventive Particulate Monitoring and Control Solutions

- A network of B-PACs™ and FilterWARE™ HMI/SCADA and reporting software automate EPA MACT compliance
- Full pre-project engineering, commissioning, plant systems integration and ongoing remote and onsite support are provided

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Steel - Electric Arc & Blast Furnace



Leading Steel Producers Exceed EPA Requirements Yet Cut Costs with DynaCHARGE™ and B-PAC™

- Low cost imported steel places operating budget challenges on domestic producers
- Proactive steel producers are meeting regulations while increasing uptime and lowering operating costs with Auburn FilterSense solutions

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Contact Information

Earl Parker

Sr. Regional Sales Manager
Sr. Application Specialist

978-927-4304, Ext 102
Mobile: 781-727-7221
earl.parker@auburnfiltersense.com



Particulate Monitoring and Control Solutions

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Thank you.



Auburn FilterSense LLC
800 Cummings Center, 355W
Beverly, MA 01915 USA

Tel: 978-777-2460
Fax: 978-777-8820
www.auburnsys.com
sales@auburnsys.com

Tel: 978-927-4304
Fax: 978-927-4329
www.filtersense.com
info@filtersense.com

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