Providing Dust Collector Insights

Donaldson's iCue connected filtration service eases the burden of monitoring your dust collector and gathering regulatory data. Using internet connectivity, the service tracks key functions on the collector in real time, transmits the data to a dashboard on your laptop or mobile device, and sends you alerts when attention is needed. (Learn more about service **here**.)

The 'eyes' of the iCue connected filtration service are sensors placed at key points in your dust collection system. Because certain functions are important to monitor in all systems, the iCue service integrates four standard sensors into its cellular gateway. Four others are optional, depending on your dust management needs.

Here is what each sensor reads and the value of that information:

Standard Sensors

Differential Pressure Sensor

How it works: This sensor is embedded in the gateway and connects to air lines coming from the dirty and clean air sides of the collector. The air resistance, or differential pressure (DP), is a valuable indicator of filter condition. Many regulatory agencies require DP reporting for air permits. While most collectors have a standard DP indicator, the data must be manually collected and recorded, while this sensor generates continuous data automatically.

Why it matters: Monitoring DP helps detect filter issues early, before filtration is interrupted. An increase in DP above a normal range typically indicates clogging and the need for filter replacement soon. A sudden drop in DP may signal a damaged filter that needs immediate service. By tracking DP in combination with relative airflow (discussed below) you are able to change filters when you know they are fully dust-loaded, reducing maintenance time and associated costs. With a DP sensor, collecting compliance data is also a fast and accurate process.

Relative Airflow Sensor

How it works: This sensor reads static pressure entering the collector's dirty-air plenum. The data determines whether there is sufficient air draw to move dust into the collector. Once you establish a normal airflow, you can set alarm thresholds that trigger an alert when a deviation occurs. Typically, a fluctuation greater than 20% up or down from designed airflow indicates a potential problem.

Why it matters: Like a household vacuum cleaner, a dust collector needs adequate suction to be effective. Weak airflow can leave dust in plant air or it can settle in ducts, providing fuel for a fire. Excessive airflow, on the other hand, can draw in valuable process materials or potential ignition sources. Alerted by monitoring, you can address fan speed, duct layout, or other issues affecting airflow to help minimize these issues.

Compressed Air Sensor

How it works: This sensor monitors changes in the compressed air pulse that cleans the filters (self-cleaning dust collectors only). Compressed air is used to knock particulates off the filters and into a drum. An alert is generated when pressure exceeds or falls below normal parameters, and compressed air feeding the system can be adjusted.

Why it matters: Compressed air pressure on a collector can drift outside a normal range. This often happens when a facility turns on and off other equipment that uses compressed air, changing system balance. Weak pressure allows dust to clog the filters and shorten their life. Pressure that is too high can damage filters during cleaning. With the iCue service, crews can be alerted to rebalance the compressed air system and also to turn on the compressed air supply to a collector after a temporary shutdown.

Gateway Temperature Sensor

How it works: This sensor helps you maintain the iCue service in working order by tracking temperature inside the wireless internet gateway device mounted on the collector. If it exceeds the ambient temperature of the dust collector by a value you set, an alert will trigger to intervene and reduce the gateway temperature.

Why it matters: This component of the iCue service needs to operate within certain environmental ratings. In conditions with extreme highs or lows in temperature, it is important to monitor its internal temperature.

Optional Sensors

Additional sensors can be added as options with the iCue service application. These sensors aren't integrated into the system's gateway like the standard sensors are, but they can be easily wired into it. Either digital or analog (4/20mA or 0-10V output), the sensors will work with the iCue service gateway, but to ensure compatibility, they should be procured through Donaldson. Our support team can work with you on this capability.

Particulate Monitor

How it works: This sensor is important to Environmental Health and Safety (EH&S) managers. Placed in the exhaust vent of a dust collector, it monitors particulate trends in emissions. Once you determine a clean baseline level, you can set alarms above that threshold – typically five to 10 times the baseline value, depending on the application.

Why it matters: Dust collectors can develop small dust leaks that may cause a breach of regulatory limits before dust noticeably accumulates in the plant. If you're required to do periodic stack testing, the sensor can alert you to rising emissions between tests, so you can address issues before they escalate into a failed compliance check. Likewise, monitoring factory make-up air can help you operate within your baseline levels.

This is an example output for particulate monitor sensor. The value will fluctuate naturally during pulse cleaning cycles.
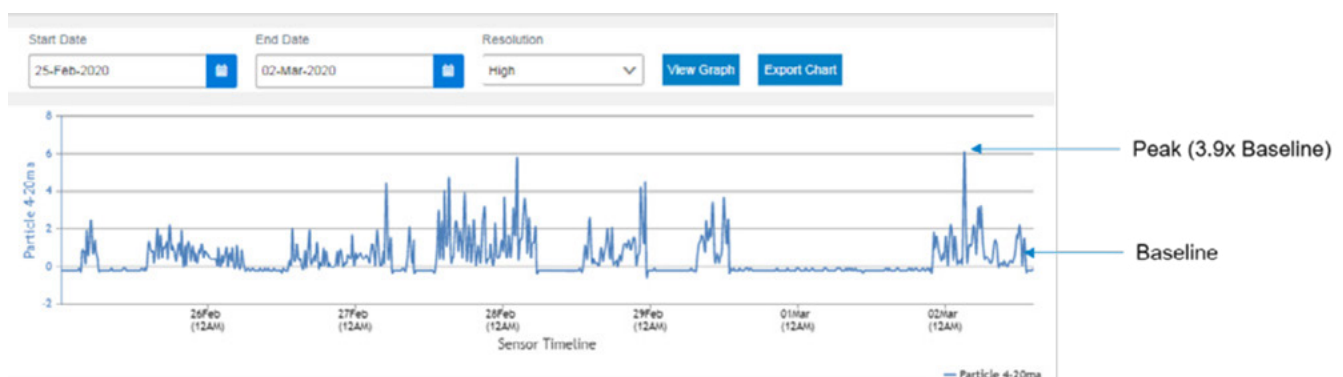
Point Level Sensor (Hopper Plug Detector)

How it works: This sensor is mounted on a rotating paddle inside the dust collector hopper. It triggers an alert when the paddle can no longer rotate, which may indicate an obstruction. While typically used to detect particulate build- up in the hopper, the sensor can also indicate a stopped rotary valve. (Note: Because the sensor extends into the disposal drum and can be damaged during waste removal, it is not recommended as a drum level indicator.)

Why it matters: In humid applications, agglomerative dust can become an issue. Dust can congeal and bridge in the equipment hopper, interrupting filtration. The issue might not be apparent until dust backs up into facility air, requiring downtime to unplug the collector, get it back up and running, and clean up dust from plant surfaces. With an alert that a plug is forming, teams can trouble-shoot the issue when it's smaller, before filtration is interrupted.

Internal Temperature and Humidity Sensor

How it works: This sensor detects both temperature and humidity from a single probe. The probe is mounted inside the collector or a duct, and two analog outputs connect to analog inputs on the gateway. Once temperature and humidity baselines and alarm levels are set, you can be notified when the dust collector operates outside normal ranges – before plugging or other issues develop.

Why it matters: If your facility has a temperature-controlled process or high-temperature concerns, you may need the dust collector to operate within a specific temperature range. Or, in humid environments, you may want to avoid humidity levels in the collector that obstruct airflow and cause plugging in the ducts, filter, or dust collector hopper. With notification that these ranges have been exceeded, you can adjust temperatures or humidity levels before they lead to damage to product or equipment.

Secondary Differential Pressure Sensor

How it works: Facilities with stringent air quality standards often have a second set of filters in the outlet of their dust collector – typically, HEPA filters. The iCue service sensor measures differential pressure (DP) across the HEPA media, similar to DP sensing for primary filters. An increase or decrease in DP outside a determined range can indicate a need for service.

Why it matters: A sudden spike in DP at the secondary filter stage can indicate that the primary filters have a leak and require immediate attention. A gradual rise in DP across these secondary HEPA filters helps determine optimal service intervals. Because HEPA filters are expensive, replacing them based on condition and DP parameters – rather than on arbitrary service intervals – can help save operating and maintenance costs.

For more information…

For additional details on the iCue gateway and the environmental specifications for the standard sensors, please see the Donaldson iCue Sensor Integrated Gateway Manual. For assistance with the iCue application or hardware, please contact your Donaldson account representative or email our support group at **iCueSupport@Donaldson.com.**

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