



Connected Solutions
iCue™ Service Sensors

Providing Dust Collector Insights

The iCue™ connected filtration service from Donaldson eases the burden of monitoring your dust collector and gathering regulatory data. The service tracks key functions on the collector in real time, transmitting data to a web-based dashboard that can be accessed through your laptop or mobile devices. Several standard and optional sensors are utilized to monitor key performance parameters and provide additional analytics like pulse valve health or hours of service. When the iCue monitoring service detects a parameter is outside of the defined range, the iCue system sends an alert notifying you that 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 standard sensors into its cellular gateway. 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, with iCue, this sensor can be read continuously data automatically and allows easy reporting generation.

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 filter that has been damaged and 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 a fast and accurate process.

Airflow Sensor

How it works: This sensor monitors airflow. You can set alarm thresholds that trigger an alert when a deviation occurs. The data then helps you determine whether you have sufficient air draw to move your dust into the collector. 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 the dust cake off the filters and into a drum. An alert is generated when pressure exceeds or falls below normal parameters, so 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 the system balance, or when a pulse valve is not operating normally. Weak pressure doesn't fully pulse off the dust cake, which over time can shorten filter 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 or evaluate a potential pulse valve issue.

Gateway Temperature Sensor

How it works: This sensor helps you maintain the iCue service in working order by tracking temperature inside the sensor integrated 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

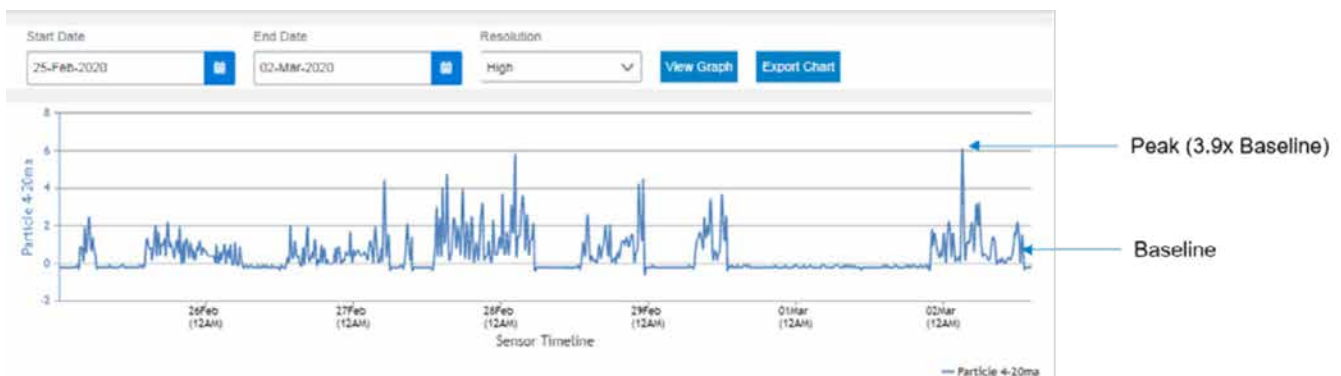
Additional sensors can be added as options with the iCue service application. These sensors aren't integrated into the system's gateway like the standard sensors are, but they can be easily wired into it. Either digital or analog (4/20mA or Relay output), the sensors will work with the iCue service gateway, 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 from the collector. 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 and permit requirements.

Why it matters: Dust collectors can develop small dust leaks that may cause a breach of regulatory limits before dust noticeably accumulates inside or outside 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, when exhausting inside the building, which saves significant energy cost, it is even more important to monitor emissions levels to avoid high particulate levels in the plant.

This is an example output for a particulate monitor sensor. The value will fluctuate naturally during pulse cleaning cycles.



Bin Level Sensor

How it works: This sensor alerts users when their dust collector bins are nearly full, removing the guesswork about when to empty them. This sensor is especially useful for operations whose bins fill frequently.

Why it matters: It is difficult and time consuming to determine when bins are full. The iCue service reduces the need to manually check fill levels, and can help prevent both filter damage and the mess and cleanup burden that can result from dust overflow.

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 shutdown 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 and 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 manage operating and maintenance costs.

Rotary Valve Sensor (Zero Speed Switch)

How it works: This sensor, also referred to as a “zero speed switch,” is typically used on dust collectors that have a rotary discharge valve at the bottom of the hopper. The sensor is made up of two components working in concert: a magnetic disk attached to the rotating shaft, and a sensor element that detects shaft rotation. The iCue monitoring service will provide an alert if the shaft stops rotating when the collector is operating.

Why it matters: Clogged or jammed rotary valves are a common dust collector issue. If excess material overwhelms the rotary valve, it can stop its rotation. If the rotary valve isn't engaged while the collector is running, dust will not be properly discharged from the hopper. The dust will begin to fill up the collector and impact filter performance. The event could result in a loss of airflow, premature filter wear and unplanned downtime for additional maintenance.

While a Rotary Valve Sensor is available from Donaldson, the feature is compatible with most off-the-shelf sensors.

4-20 mA Percentage Sensor

How it works: Easily integrate any off-the-shelf 4-20mA sensor, allowing the iCue service to display the sensor value as a percentage (4 mA = 0%, 20 mA = 100%) via its dashboard.

Why it matters: This compatibility is ideal for customers who need the performance and versatility of a sensor not directly supported through the iCue service. Proprietary or non-dust collector applications, applications with unique sensor requirements (e.g. wide temperature range, safety certifications, etc) or speculative projects can now be integrated into the iCue dashboard.

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.

The iCue service is available in the US, Canada, Europe, and Asia Pacific. Contact us at:

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