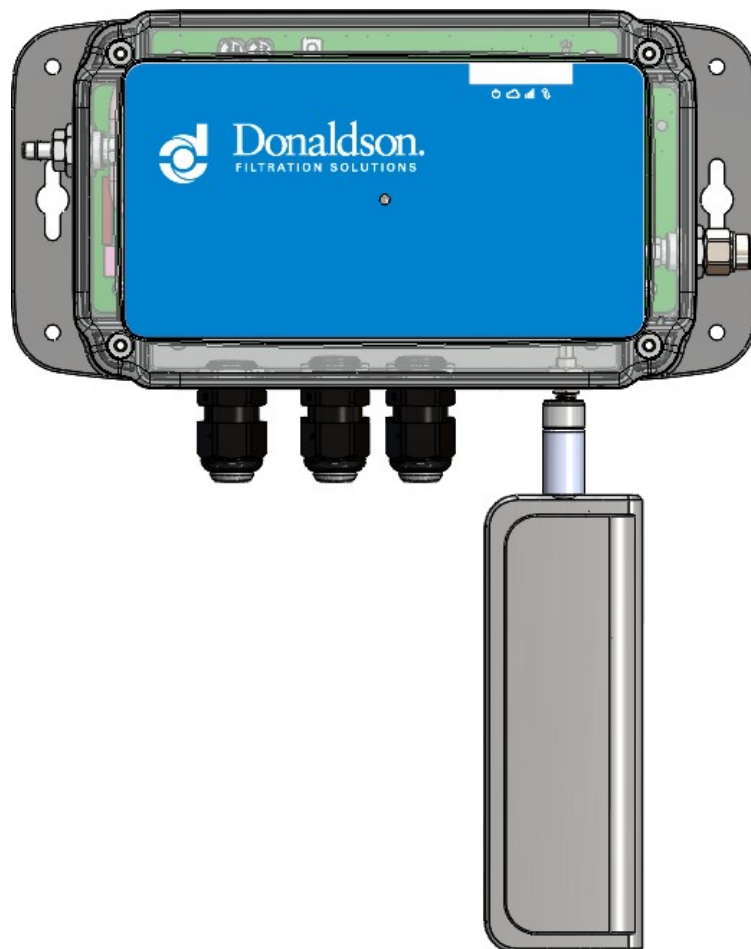# Donaldson™ iCue™ Sensor Integrated Gateway

Installation, Operation and Maintenance Manual

⚠ This manual contains specific precautions related to worker safety. The hazard alert image denotes safety related instructions and warnings in this manual. DO NOT install, operate, or perform maintenance on this product until you have read and understood the instructions, precautions and warnings contained within

IMPORTANT NOTES

This manual has been supplied to assist with the installation, operation and maintenance of the Donaldson™ iCue™ Sensor Integrated Gateway. Please read the manual before installing, operating, or performing maintenance on this device as it contains specific precautions for worker safety. It is the owner's responsibility to ensure that this manual is available for use by installers, operators and maintenance personnel that will be working with this dust collector accessory.

This manual is the property of the owner. DO NOT operate the device until you have read and understood the instructions and warnings located in the installation and operation manual.

For additional copies of this manual, contact iCueSupport@donaldson.com.

 The Safety Alert Symbol indicates a hazardous situation which, if not avoided could result in death or serious injury. Obey all safety messages following this symbol to avoid possible injury or death. The possible hazards are explained in the associated text messages.

NOTICE **NOTICE indicates a potential situation or practice which is not expected to result in personal injury, but which if not avoided, may result in damage to equipment.**

Disclaimers

Information in this document is subject to change without notice and does not represent a commitment on the part of the Donaldson Company, Inc. Donaldson provides this documents "as is," without warranty of any kind, expressed or implied, including, but not limited to, the implied warranties of fitness or merchantability for a particular purpose. Donaldson may make improvements and/or changes in this manual or in the product(s) and/or the programs described in this manual at any time.

Contents

1   Safety Communication

The Donaldson™ iCue™ Sensor Integrated Gateway should not be used to detect, monitor, warn, or alert personnel to hazards, potential safety issues, or combustion risks. Users should not rely on readings from the product to provide emergency or hazard prevention or for emergency response activities and decisions. Users remain solely responsible for maintaining a safe work environment. All dust collection equipment and accessories should be operated and maintained in accordance with the manufacturer's instructions.

Many factors beyond the control of Donaldson can affect the use and performance of Donaldson products in a particular application, including the conditions under which the product is used.

Since these factors are uniquely within the user's knowledge and control, it is essential the user evaluate the Donaldson products to determine whether the product is fit for the particular purpose and suitable for the user's application.

The device is not designed or approved to be used in any Hazardous Locations. Do not install or operate device in an area classified as hazardous.

Electrical installation must be performed by a qualified electrician. All local, regional, and national electrical installation regulations must be followed, including the installation of circuit protection and disconnecting means where required.

Only qualified maintenance personnel should service this equipment.

Prior to installing or maintaining equipment, ensure all energy sources are put into a safe condition by following your facilities approved energy-control procedures.

This system does not replace the need for any routine or required monitoring or maintenance of your dust collection system. Donaldson does not guarantee the accuracy of any transmitted values.

2   Product Description

System Description

The Donaldson™ iCue™ Sensor Integrated Gateway is designed for use with Donaldson's iCue™ Connected Filtration Service for Dust Collectors.

The gateway captures data from sensors and transmits that data wirelessly to the web-based Donaldson iCue application. The gateway is independent of the dust collector control system.

Sensors:

The gateway has internal sensors for sensing filter differential pressure and compressed air pressure of the dust collector. The gateway also has inputs for Donaldson approved optional sensors, which are wired into the gateway.

Communications:

The gateway utilizes a cellular connection to transmit sensor data to the Donaldson iCue application. The cellular data plan and preinstalled SIM card are provided by Donaldson. The SIM card will only work with Donaldson's service and should not be removed.

Note: This manual only covers the installation, operation and troubleshooting of the Donaldson™ iCue™ Sensor Integrated Gateway. Reference the documentation section in the dashboard application for additional information on configuring and using the application.

Technical Specifications

Specifications	
General	
Input Power	Gateway: 7-32VDC; 10W max
Cellular Technologies	LTE, 2G
Dimensions	7.63 x 4.63 x 3.09 in. (193.80 x 117.60 x 78.49 mm)
Weight	1.5-lbs (0.68 kg)
Operating Temperature	-40 to 70C (-40 to 158F)
Ingress Rating	IP66
Sensor Ratings	
Vacuum	27 inches of H20 (6.72 Kpa)
Compressed Air Pressure	150 psi (10.34 bar)
Temperature Range	-40 to 85C (-40 to 185F)
External Inputs	Analog: 4 Inputs; 4-20mA or 0-10V. 24VDC Supply (100 mA max) Digital: 2 Inputs; Dry contact closure
Certifications	
Certifications	CE

3   Operation

The gateway is always on, monitoring the sensors associated with the solution. If a sensor value exceeds the user-defined alert thresholds, the gateway will communicate that data to the Donaldson iCue application for alerting purposes. Otherwise, during normal operation the gateway communicates to the Donaldson iCue application at predefined intervals.

LEDs on the gateway indicate the status of the gateway. Reference the Troubleshooting section for definition of the LED states.

4   Installation

⚠️ Electrical installation must be performed by a qualified electrician and comply with all applicable national and local codes.

Compressed air installation must be performed by a qualified pipe fitter.

NOTICE   Penetrations into the dust collector must be air and dust tight.

Location Considerations

The gateway should be installed in a convenient location that does not interfere with any safety systems or the normal operation and maintenance of the collector. The preferred location is as high as feasible to increase the cellular signal strength.

Overview

The hardware kit received includes the gateway and other accessories required for installation; reference Replacement Parts List for what is included in the kit. There may be situations where additional materials are needed to complete the installation. A typical installation will involve the following steps:

1. Shut down the dust collector and isolate the compressed air supply source.

2. Install the Donaldson gateway.

3. Connect pneumatic tubing to the gateway.

4. Connect optional sensors to the gateway.

5. Attach the antenna to the gateway.

Mounting

Magnets

Magnets with pre-applied adhesive have been supplied to allow for quick and easy installation. The magnets can be applied to the gateway and/or the power supply. To use the magnetic mounts:

1. Verify the device surface is clean and dry.
2. Remove the film from the adhesive disc mounted to the magnet and firmly press the magnet into place.
3. Remove the metallic keeper and insulator from the magnets and mount the device.

   Note: Allow 20 minutes for the adhesive to cure prior to mounting the gateway from a metallic surface.

Flange

The gateway and power supply may be mounted using the mounting flanges of each device. Hardware to mount the components using the flanges is to be provided by the installer.
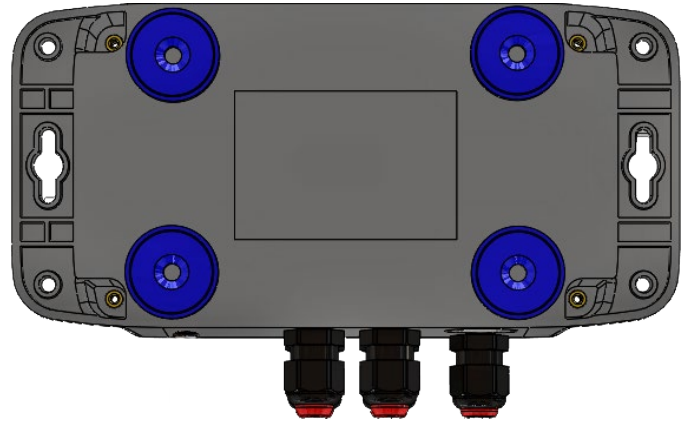
Gateway Electrical Installation

The Gateway requires 7-32 VDC input power. A single-phase power supply is included in the kit to power the gateway. Reference Terminal Strip Designators for terminal strip locations when installing the VDC power wiring. Reference the power supply label for wire colour coding.
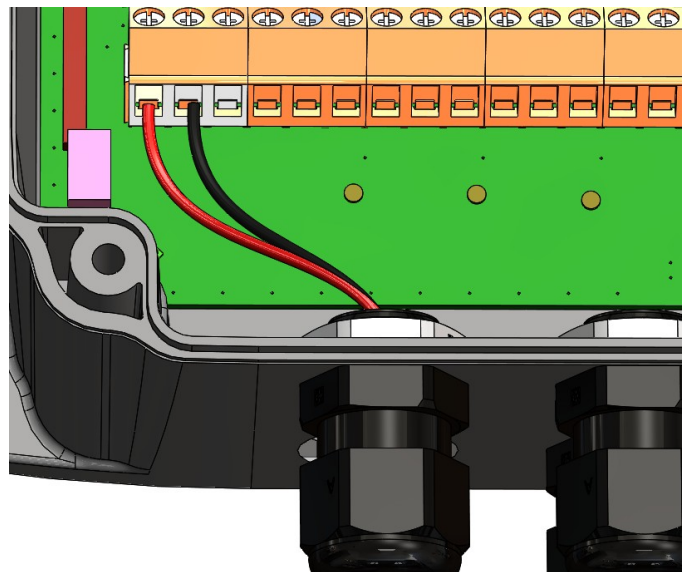
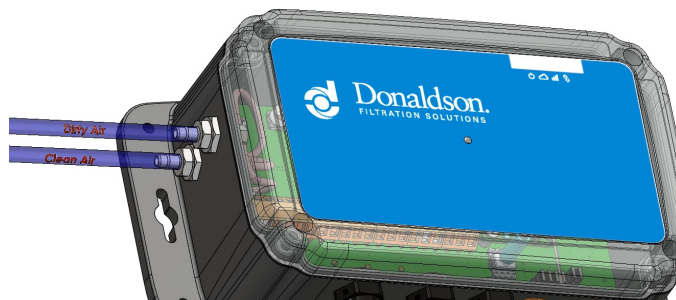## Low Pressure (∆P) Pneumatic Installation

Note: This kit contains barbed t-fittings and push-to-connect tee fittings for use with 4mm ID flexible tubing. Either can be used depending on the configuration of the dust collector. Additional material may be required.

1. Insert a t-fitting into each filter pressure sensing line (clean air and dirty air). Reference the dust collector manual for assistance in identifying the filter pressure sense lines.

    Notice: To prevent gateway damage from condensation, it is recommended that the gateway is installed above the location of the filter pressure sense line ports.

2. Using the supplied 4 mm ID translucent blue tubing, connect the 'dirty air' pressure sense line to the Dirty port of the gateway.

3. Using the supplied 4 mm ID translucent blue tubing, connect the 'clean air' pressure sense line to the Clean port of the gateway.

    Notice: To prevent inaccurate sensor readings, it is recommended the tubing is installed in such a manner to avoid low spots where condensation may accumulate.

## High Pressure (Compressed Air) Pneumatic Installation

Note: Depending on the configuration of the dust collector, additional pipe fittings may be required.

1. Isolate, lockout, and depressurize the compressed air manifold.

2. Install the ¼ inch NPT push-to-connect fitting into an unused port on the compressed air manifold. If no ports are available, the fitting can be installed in a tee for the incoming air to the manifold.

3. Install the 6mm OD solid blue tubing between the fitting on the compressed air manifold and the gateway.

4. Restore the compressed air supply to the manifold.
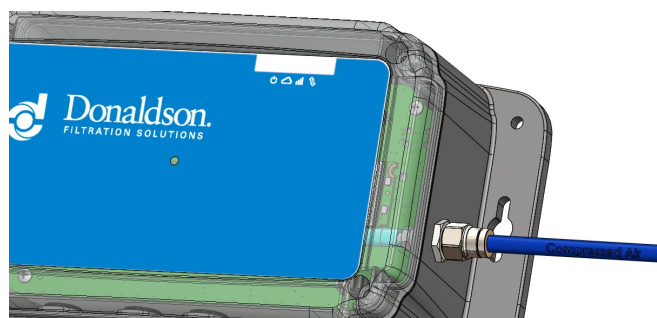
Gateway Final Assembly

1. Connect the cellular antenna and hand tighten.

2. Restore power to the gateway.

3. Once the gateway is energized and through its start-up routine (all LEDs Red, Orange, Green). Verify the Power and iCue Service Connectivity LEDs turn green. This may take several minutes.
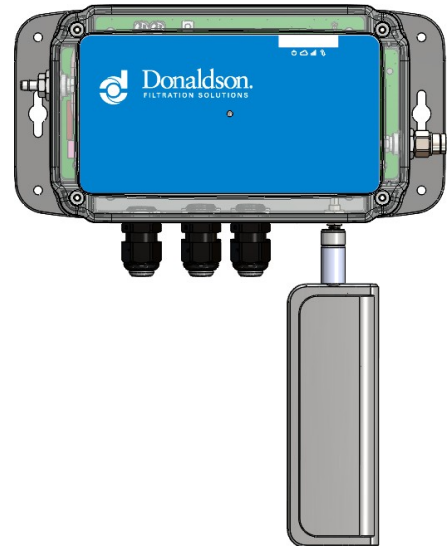
5   Replacement Parts List

Part Number	Description
R060077	Kit, Sensor Gateway, EU (includes antenna, power supply, Sensor Gateway Assembly, magnets, tubing, and fittings)
R060078	Sensor Gateway Assembly, EU
R060020	Antenna, RF, 4G LTE
R060021	Power Supply, 24VDC, 40W

6   Terminal Strip Designators

The following table denotes the use of each terminal on the internal gateway terminal strip as well as any limitations.

Terminal Number	Terminal Name	Input Constraints
1	DC Power +	7-32 VDC
2	DC Power -	
3	Chassis Ground	
4	Analog Input 1 - 24VDC Output	Max output 25 mA
5	Analog Input 1 - Input Signal	10VDC, 20mA max
6	Analog Input 1 - Ground	
7	Analog Input 2 - 24VDC Output	Max output 25 mA
8	Analog Input 2 - Input Signal	10VDC, 20mA, max
9	Analog Input 2 - Ground	
10	Analog Input 3 - 24VDC Output	Max output 25 mA
11	Analog Input 3 - Input Signal	10VDC, 20mA max
12	Analog Input 3 - Ground	
13	Analog Input 4 - 24VDC Output	Max output 25 mA
14	Analog Input 4 - Input Signal	10VDC, 20mA max
15	Analog Input 4 - Ground	
16	Digital Input 1 - 3.3VDC Output	Dry Contact Supply - not for device power
17	Digital Input 1 - Input Signal	3.3VDC Max
18	Digital Input 1 - Ground	
19	Digital Input 2 - 3.3VDC Output	Dry Contact Supply - not for device power
20	Digital Input 2 - Input Signal	3.3VDC Max
21	Digital Input 2 - Ground	

7   Troubleshooting

| Item	LED	Color	Input
1	Power	Green	Power On
		Orange	Data transmission trigger by wake-up switch
2	iCue Service Connectivity	Green	Connected to Donaldson iCue application
		Orange	Initializing connection to Donaldson iCue application
		Red	Connection failure
		Off	Not connected to Donaldson iCue application
3	Cellular Strength	Green	Good connection quality
		Orange	Medium connection quality
		Red	Low connection quality
		Off	No cellular connection
4	Data Transmission	Green	On while sending messages to Donaldson iCue application

Problem	Remedy
Cellular Strength LED is OFF or Red	Verify the cellular antenna is securely installed on the device and not damaged.
	Move the device to a higher location.
	Install a cabled antenna and move it to another location where the network signal can be properly received. A magnetic cable mount can be purchased when needed by contacting iCueSupport@Donaldson.com.
iCue Service Connectivity LED is not Green	If Cellular Strength LED is OFF or Red, reference troubleshooting for that condition. Note: it may take up to 5 minutes for the iCue Service Connectivity LED to turn green after the Cellular LED illuminates.
	Contact iCueSupport@Donaldson.com.
LEDs Blinking	The LEDs blink during unit start-up, infrequent normal processes and as a result of abnormal behaviour. If you notice the LEDs blinking, monitor the unit for five minutes. If the LEDs continue to blink after this period of time, contact iCue Support at iCueSupport@Donaldson.com.

If additional troubleshooting assistance is required, please contact iCueSupport@Donaldson.com.

8   Optional Sensor Wiring

Only Donaldson approved optional sensors should be used with the Donaldson™ iCue™ Sensor Integrated Gateway. The gateway can accommodate up to four (4) analog sensors and two (2) digital inputs.
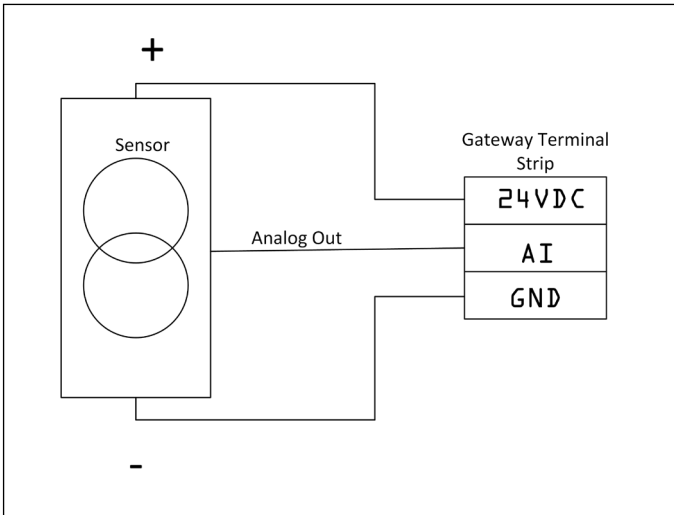
Analog Sensors

The Donaldson™ iCue™ Sensor Integrated Gateway can accommodate analog sensors with a 0-10VDC or 0/4-20mA output. A physical jumper on the gateway circuit board is used to select the sensor input type.
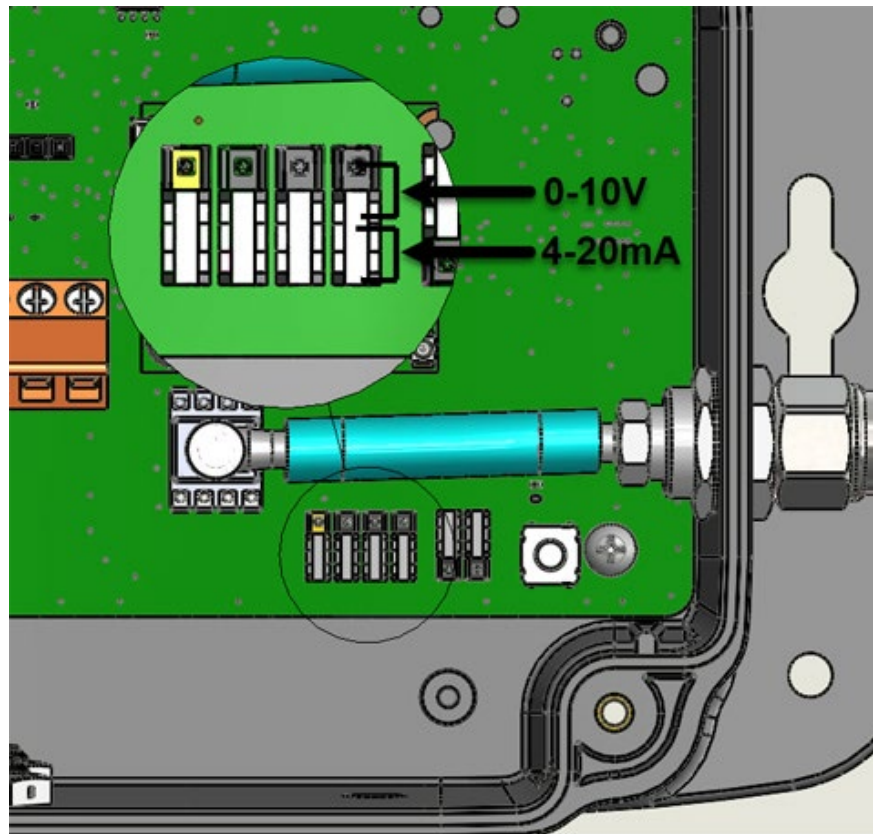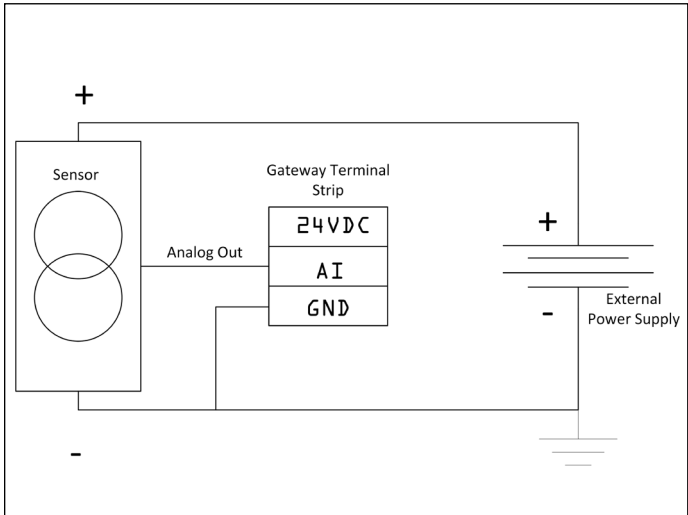
The Donaldson™ iCue™ Sensor Integrated Gateway can support 2, 3, or 4 wire sensors using the following wiring configurations. These diagrams are representative of installing an analog sensor on any of the four analog input lines.
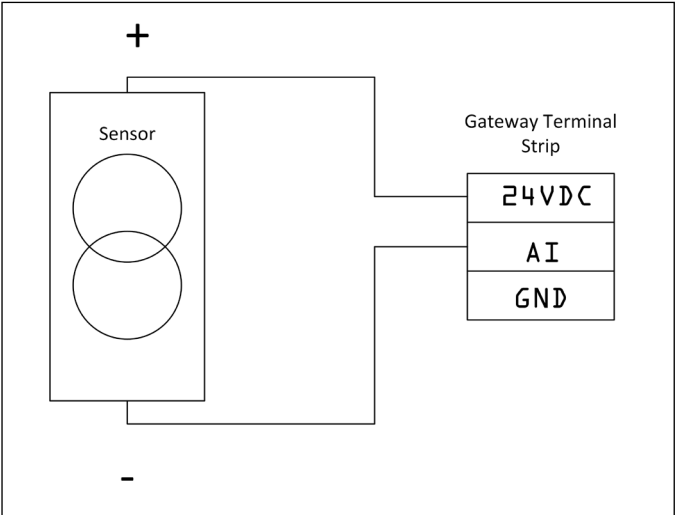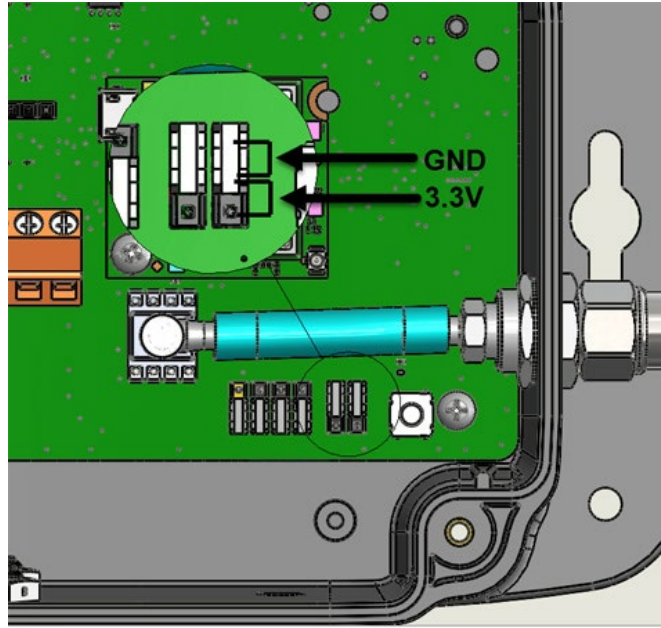

2 Wire Sensor


3 Wire Sensor

4 Wire Sensor

Digital Sensors

The Donaldson™ iCue™ Sensor Integrated Gateway can accommodate sensors with normally open or normally closed dry contacts. A physical jumper on the gateway circuit board is used to configure the board for the appropriate sensing scenario and should be set according to the following position:

		Sensed Stated - By Gateway		
	Wiring Diagram	Unactuated Switch State	Actuated Switch State	Jumper Setting
Normally Open Contact - High	Digital High Switch	Low	High	GND
Normally Closed Contact - High	Digital High Switch	High	Low	GND
Normally Open Contact - Low	Digital Low Switch	High	Low	3V3
Normally Closed Contact - Low	Digital Low Switch	Low	High	3V3

Note: This is a low voltage connection. 3.3VDC may be present on one side of the contact.

Digital "High" Switch

Digital "Low" Switch
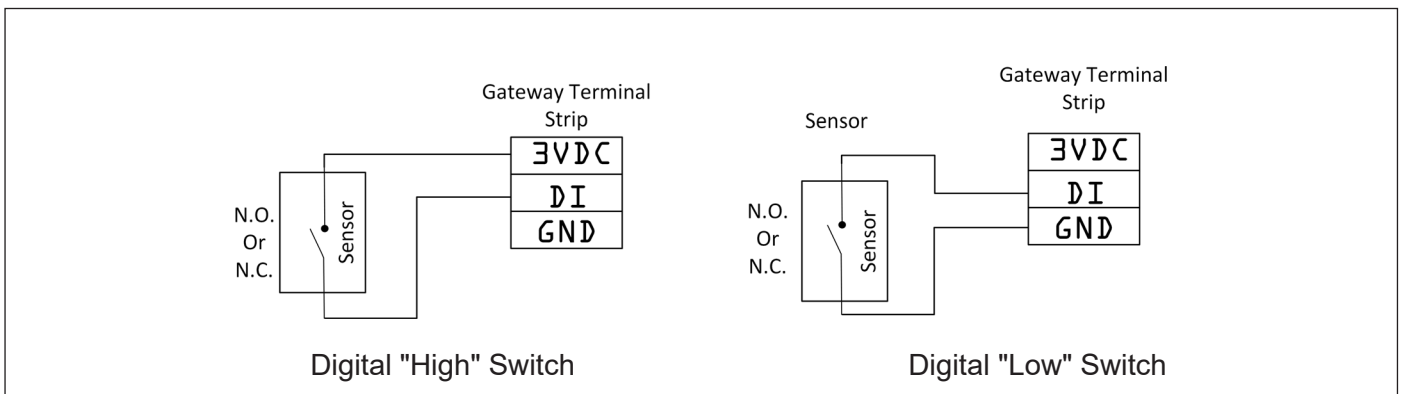
Appendix A - Regulatory Information

Donaldson Company, Inc.
1400 West 94th Street
Bloomington, MN 55431   USA

Mailing Address
PO Box 1299
Minneapolis, MN 55440   USA

EU Declaration of Conformity

Radio Equipment:
    Name: Sensor Integrated Gateway
    Model: R060077

This declaration of conformity is issued under sole responsibility of the manufacturer who declares that the above described radio equipment is in conformity with the following relevant Union harmonization legislations:

> **Radio Equipment Directive 2014/53/EU (RED)**
> **RoHS2 Directive 2011/65/EU**

The conformity assessment procedure used for this declaration is Annex III of the RED 2014/53/EU and the product will bear the CE-Marking CE accordingly.

Conformity to the essential requirements of the legislation(s) have been demonstrated by using the following standards:

Health and Safety RED, (Art 3(1) (a)):	**IEC 62368-1:2014 (Second Edition), and/or EN 62368-1:2014/A11:2017, EN 50665:2017, EN 62311:2008**
EMC RED, (Art 3(1) (b)):	**EN 301 489-1 V2.2.3 (2019-11), Draft EN 301 489-52 V1.1.0 (2016-11)**
Radio Spectrum RED, (Art 3(2)):	**EN 301 511 V12.5.1 (2017-03), EN 301 908-13 V11.1.2 (2017-07)**
RoHS2 Directive 2011/65/EU:	**EU RoHS Directive 2011/65/EU and its amendment directives 2015/863/EU. IEC 62321-3-1:2013**

The following accessory allows the object of the declaration described above to operate as intended and in conformity with this EU declaration of conformity: Software version 1.1.2 and following versions.

Signed for and on behalf of: Donaldson
Place and date of release: August 24, 2020 in Bloomington, MN, USA

Signature:

Name, function: Peter Vitko, Engineering Manager

Service Notes

Date	Service Performed	Notes

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Minneapolis, MN

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