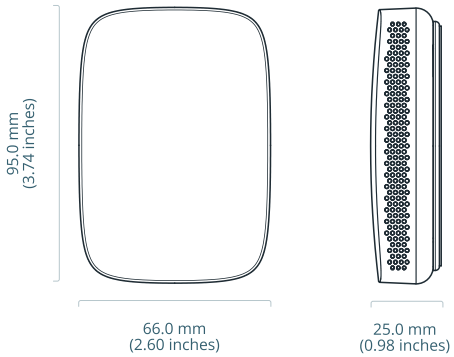
DISRUPTIVE
TECHNOLOGIES

Product Datasheet

Wireless CO2 Sensor

Rev 1.3

Overview



Description

The Wireless CO2 Sensor measures CO2 (ppm), Temperature (°C/°F), Relative Humidity (%RH) and Barometric Pressure (Pa/bar) in the surrounding air and wirelessly transmits the result to nearby Cloud Connectors (gateways) via the SecureDataShot™ protocol.

Cloud Connectors relay data from wireless sensors to the cloud via cellular or ethernet connectivity. From the cloud, the data can be integrated into other services using REST APIs and webhooks or viewed directly in Studio (web application).

Applications

- Indoor Air Quality Monitoring (IAQ)
- Demand-Controlled Ventilation (DVC)

Specifications

Carbon Dioxide	
Measurement Range	400 to 5000 ppm
Accuracy	± (30 ppm, +3% of reading)
Technology	Non Dispersive Infrared (NDIR)

Temperature	
Measurement Range	0°C to +50°C (32°F to 120°F)
Accuracy	± 1°C (± 1.8°F)
Technology	CMOS

Humidity	
Measurement Range	10 to 95% RH
Accuracy	±3%
Technology	CMOS

Barometric Pressure	
Measurement Range	500 to 2000 hPa (mbar)
Accuracy	± 1hPa (mbar)
Technology	CMOS

Radio & Communication	
Communication Protocol	SecureDataShot™
Radio Frequency	868 MHz / 915 MHz
Radio Range	Up to 250 m / 820 ft indoors

Product Name	Product Number	Region	Region
Wireless CO2 Sensor EU	102521	Europe	Europe
Wireless CO2 Sensor US	102522	North America	North America

How it works

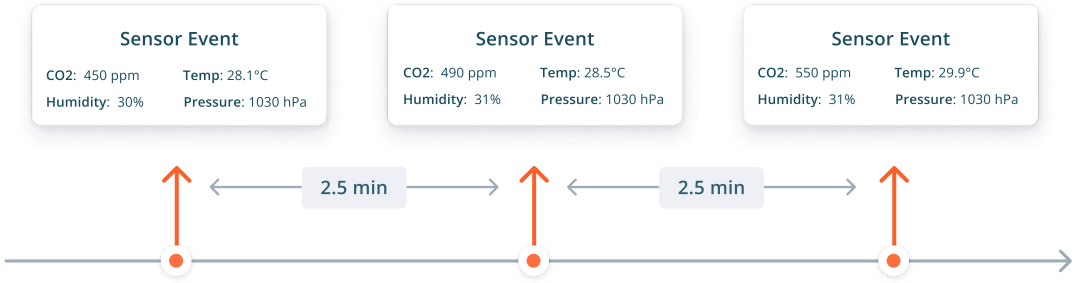
Default Operation

The Wireless CO2 Sensor measures Carbon Dioxide (ppm), Temperature (°C/°F), Relative Humidity (%RH) and Barometric Pressure (Pa/Bar) in the surrounding air and wirelessly transmits the result.

The radio protocol used is SecureDataShot™ and the data is relayed to DT Cloud infrastructure using a SecureDataShot™ enabled gateway, also known as a Cloud Connector. From the cloud the data can be viewed directly in Studio (web application) or sent to external services using webhooks or a REST API.

Heartbeat Interval

The Heartbeat Interval controls how often data is measured and sent to the cloud and can be set using Studio or the API. The Wireless CO2 Sensor can be set to 2.5, 5, 15, 30, 45, or 60-minutes.



Sensor events during default operation with a 2.5 minute Heartbeat Interval

Settling Period & Self-Calibration Routine

Factory Calibration

Every sensor is factory calibrated at 400 ppm.

Settling Period

The sensor needs 7 days of calibration time before the CO2 measurements are accurate.

Calibration Routine

The sensor has a built-in auto zeroing feature. In order to function correctly, the sensor must be exposed to typical background levels (400-450 ppm) at least once during a 7 day period. For example, many buildings will quickly drop to background CO2 levels when unoccupied overnight or at weekends.

Altitude & Temperature Compensation

Sensors are factory calibrated at 1013 hPa. Because readings from NDIR CO2 sensors will vary with barometric pressure and temperature, the Wireless CO2 Sensor has a built in altitude and temperature correction algorithm that compensates for changes in both barometric pressure and temperature.

Technical Specification

Carbon Dioxide (CO2)	**Sensor technology**: NDIR	**Range**: 0 to 5000 ppm
	Typical Accuracy: ± (30 ppm, +3% of reading), max ± (45 ppm, +3% of reading)	
Temperature	**Sensor technology**: CMOS	**Range**: 0 to 50°C (32 - 120°F)
	Typical Accuracy: ± 1°C (± 1.8°F)	
Relative Humidity	**Sensor technology**: CMOS	**Range**: 10 to 95% (non condensing)
	Typical Accuracy: ± 3%	
Pressure	**Sensor technology**: CMOS	**Range**: 500 to 1110 hPa (mbar)
	Typical Accuracy: ± 1 hPa (mbar)	

Operating & Storage Conditions

Operating Conditions	**Temperature**: 0 to 50°C (32 - 120°F)	**Pressure**: 500 to 2000 hPa (mbar)
	Humidity: 0 to 95% RH (non condensing)	
Storage Conditions	Cool and dry, near normal room temperature	

Battery Specification

Battery / Lifetime	**Type**: 2x AA (Alkaline)	**Lifetime**: Up to 10 years
	The battery life is limited by the shelf life of AA batteries used, Heartbeat Interval and ambient temperature. The estimated lifetime is based on 5 min Heartbeat Interval at 25°C using the batteries supplied with the unit.	

Wireless Communication

Radio Protocol	SecureDataShot™	
Radio Frequency	**EU**: 868 MHz ISM band	**US**: 915 MHz ISM band

Radio Range

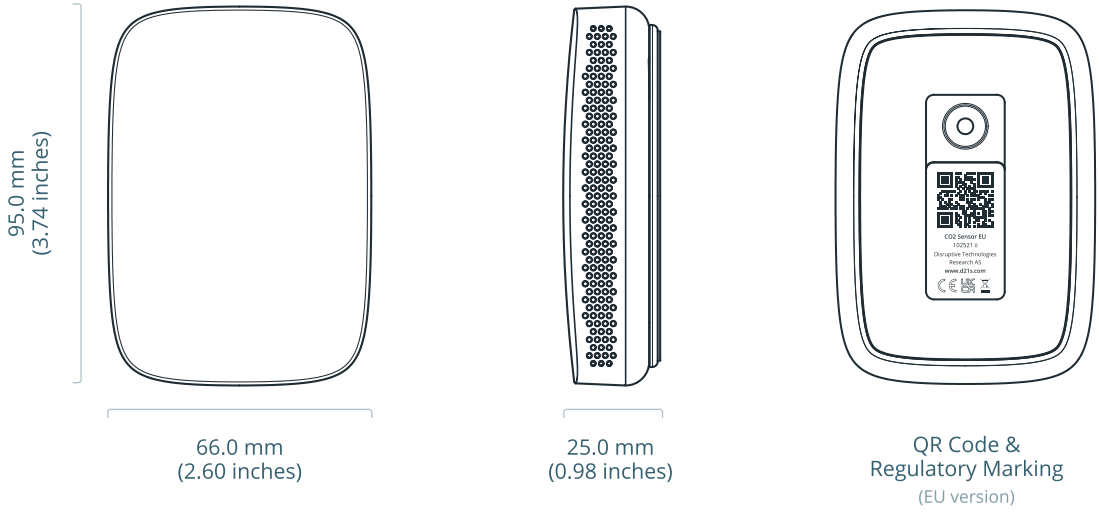
The wireless range is dependent on the gateway the sensor is communicating with.

Product	Indoor		Free Space	
Cloud Connector (1st Gen)	160 m	525 ft	5 km	16 400 ft
Cloud Connector (2nd Gen)	250 m	820 ft	10 km	32 800 ft

Estimates are based on standard ITU-R P.1238 (indoor) and ITU-R P.525 (free-space).

Mechanical Properties

Size	95 x 66 x 25 mm / 3.74 x 2.60 x 0.98 inches
Weight	116 grams / 4.1 oz
Material	Polycarbonate (PC)
Mounting method	Adhesive or screw



Product Variants

EU Version	**Product number**: 102521	**Region**: Europe
US Version	**Product number**: 102522	**Region**: North America

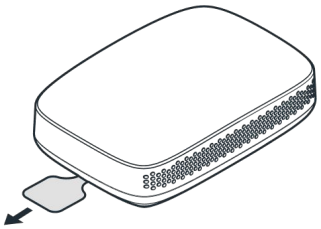
Certification & Compliance

Certification	**EU**: CE, UKCA	**US/Canada**: FCC, ISED
	Product contains FCC ID: 2ATFX-102540 IC: 25087-102540	

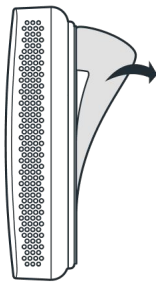
Installation Guidelines

Placement	Designed to be wall mounted. Place the device at least 1 m (3 ft) from doors, windows, exterior walls, air vents or any other heating or cooling source.
Installation Height	1-1.8 meters (3 - 6 feet) above the floor (breathing height).

Installation Process

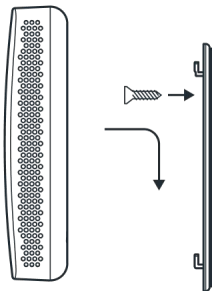


Pull the battery tab to activate the sensor



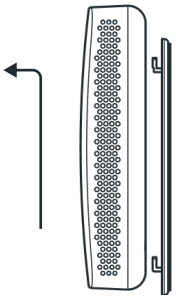
Option 1 – Mount the sensor to the wall using the adhesive. Simply peel and stick.

Or

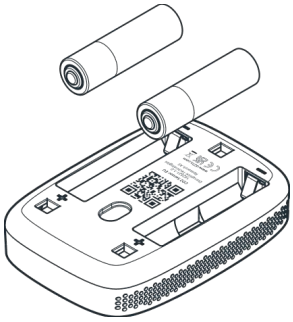


Option 2 – Mount the sensor to the wall using a screw. If neccessary, use a wall anchor.

Battery Replacement



Remove the main housing from the bracket by pushing it upwards.



Replace with two new Alkaline 1.5 AA type batteries. Pay attention to the polarity.

Ordering Information

Europe

Product No.	Name	Order Code	Region	Quantity
102521	Wireless CO2 Sensor EU	102519	Europe	1

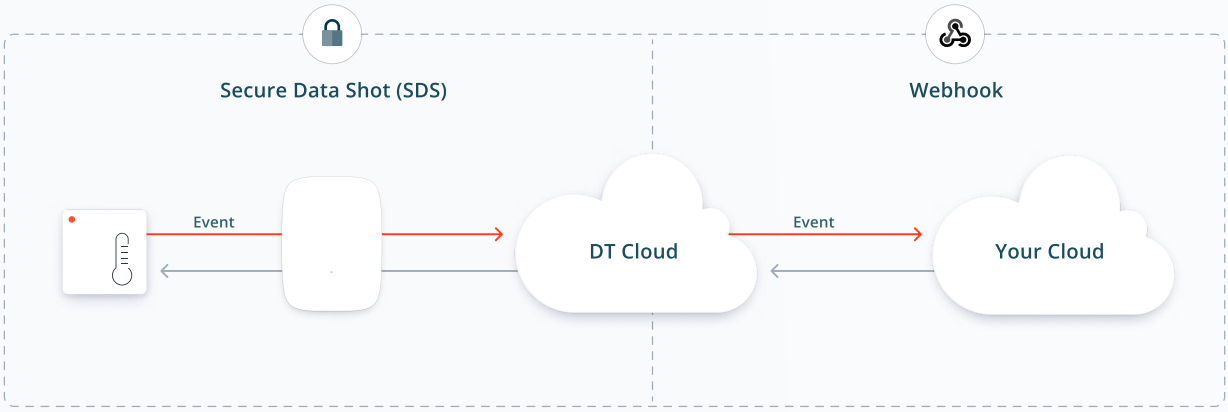
North America

Product No.	Name	Order Code	Region	Quantity
102522	Wireless CO2 Sensor US	102520	North America	1

Sensor Subscription (mandatory)

Name	1 Year	3 Year	5 Year
Sensor Subscription - CO2	800019	800020	800021

Solution Overview



Wireless Sensors

Wireless sensors instantly connect and send data to the cloud via SecureDataShot™

Cloud Connectors

Cloud Connectors automatically connect and relay data to the cloud service

Cloud Service

No servers, databases, or on-prem clients to manage - simply just install sensors and integrate the data into your own service.

Why use a cloud based sensor solution?

Zero-touch Connectivity

No pairing needed. Sensors automatically communicate through all Cloud Connectors which results in a quick and easy installation process.

24/7 Monitoring

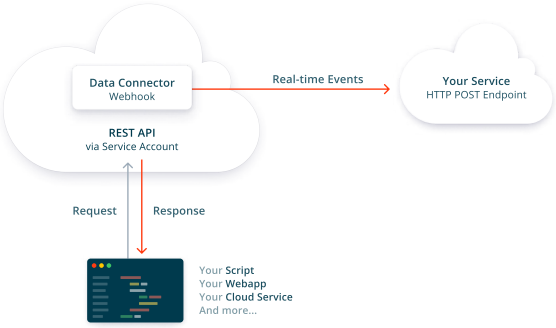
All Disruptive system components are instrumented and monitored 24 hours per day, 7 days per week. Anomalies trigger alarms and notifies our response team.

Easy to Scale

Cloud Connectors support thousands of sensors and the cloud service automatically scales for users with increasing number of sensors.

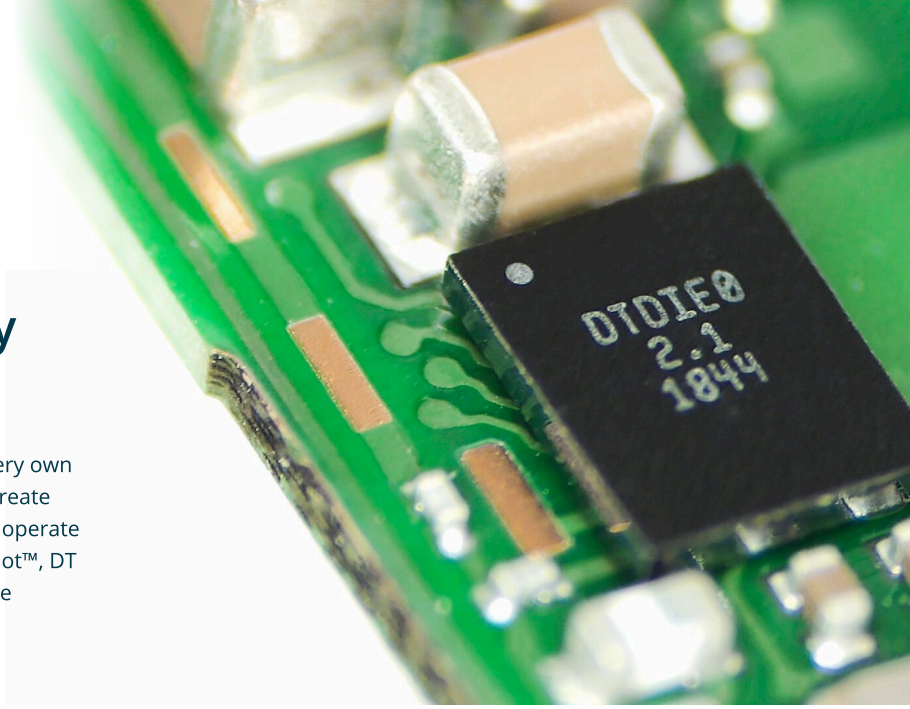
Centralized Management

No servers, databases, or on-prem clients to manage. A modern cloud platform enables secure access on any device from anywhere in the world.



REST API & Webhooks

Easily integrate the sensor data into your own, or a third-party service, using our REST API or webhooks.



Take advantage of industry leading battery life with DT Silicon

DT Wireless Sensors are powered by DT Silicon - our very own proprietary chip technology that makes it possible to create sensors that use an order of magnitude less energy to operate than other wireless sensors. Paired with SecureDataShot™, DT sensors have superior battery life while maintaining the highest level of security and ease-of-use.

- Enables tiny sensors with long battery life
- Tailor made for the SecureDataShot™ protocol

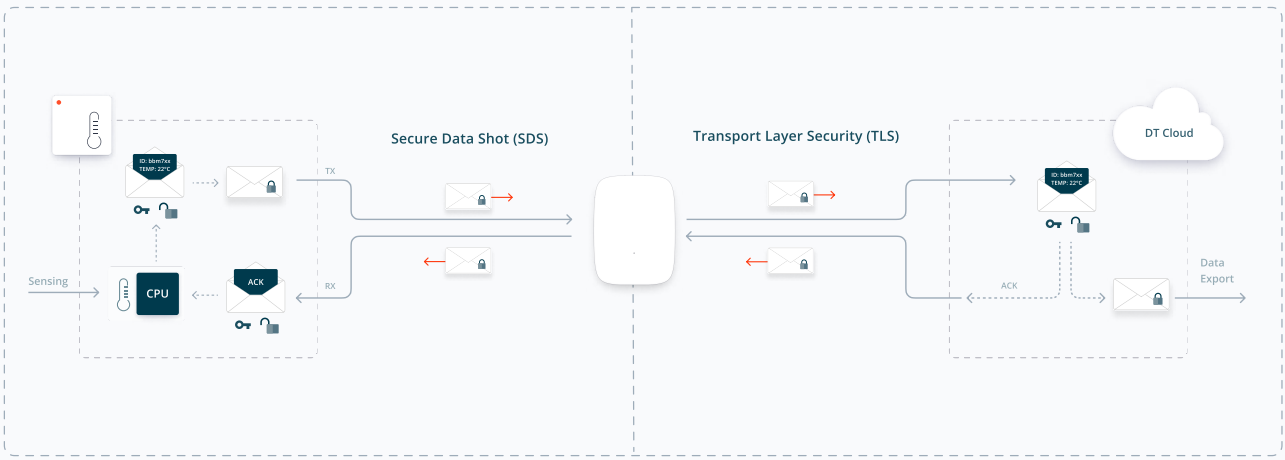
Secure by default with SecureDataShot™

SecureDataShot™ creates a secure communication channel between the sensor and the cloud instead of between the sensor and the gateway. This reduces the potential for a manipulator-in-the-middle attack by exploiting vulnerabilities in the security architecture of gateways.

- Cloud Connectors can forward data to and from sensors but cannot decrypt the sensor data.
- During manufacturing, each sensor is assigned a unique **256 bit assymmetric encryption key**, generated by a tamper-proof 140-2 Level 3 certified hardware security module.
- The public part of the asymmetric key is exchanged with Disruptive Technologies cloud via encrypted channels.

The purpose of the keys is to allow sensors to communicate securely with the cloud. In addition to the keys assigned during manufacturing, the sensor and cloud also hold a unique SecureDataShot™ session key.

- Sensor data is encrypted using symmetric AES-128 encryption/decryption in CCM-mode.
- Disruptive Cloud Connectors are provisioned with Transport Layer Security (TLS) certificates to establish a secure connection between the Cloud Connector and the cloud.



Fleetmanagement & Data Insights with Studio

Device Overview

Sort devices into projects for easy access and get an overview over data, health status and radio coverage

Flexible Dashboards

Get a quick overview of sensors and compare data with easy-to-use drag-and-drop dashboard cards

Access Control

Create role-based user accounts for people and services that need access to sensor data

Notifications

Set up simple rules for sensors and receive automatic sensor triggered notifications

Data Forwarding & API Integrations made simple

Data Connectors / Webhooks

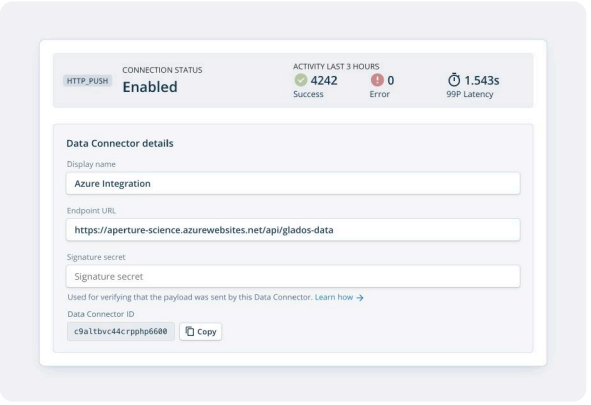
Easily configure secure webhooks to forward the data to your own service.

Service Accounts

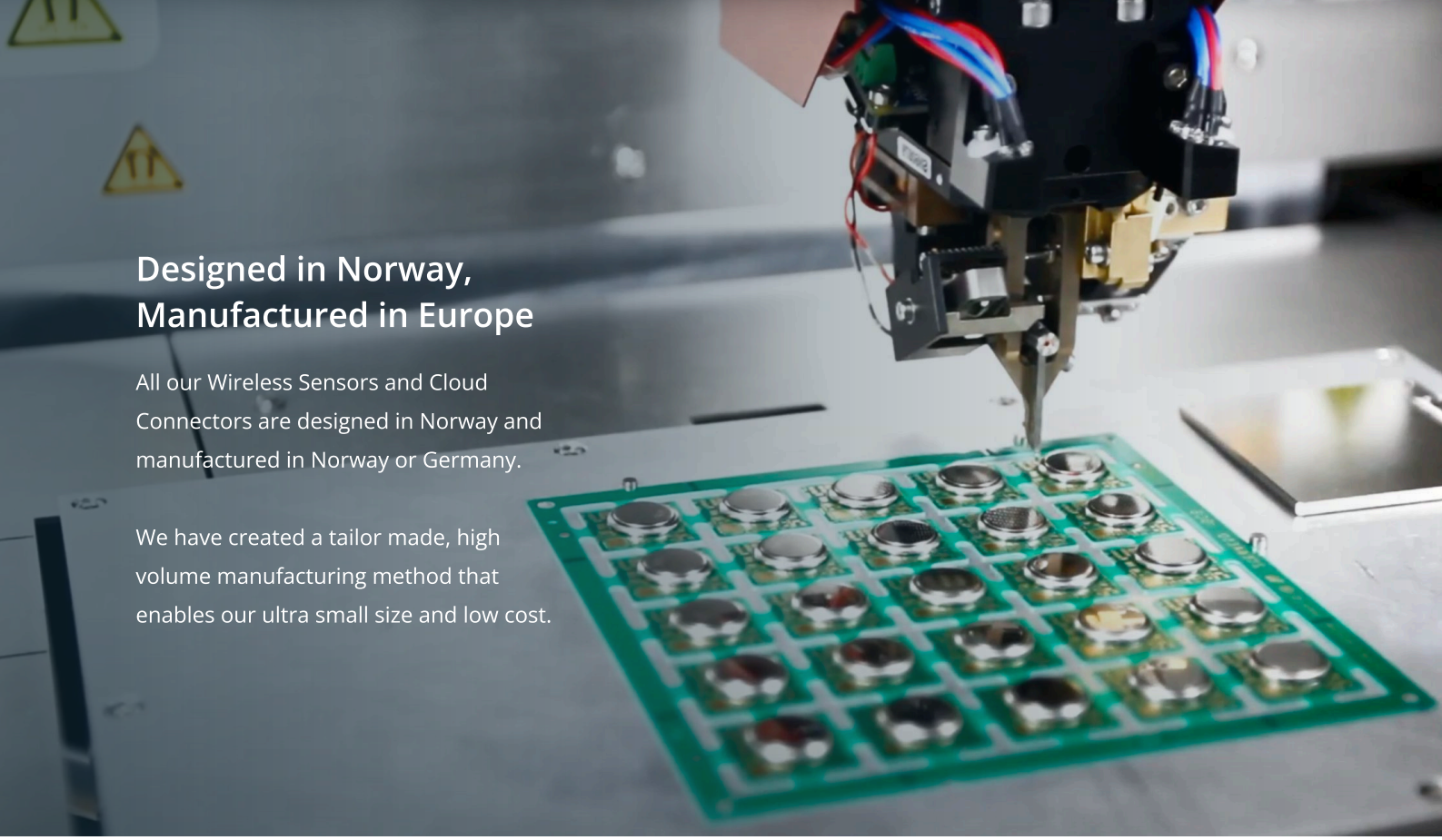
Create and manage role-based service accounts to let your own cloud service authenticate with the REST API.

Sensor Emulators

Create emulated sensors to test your API integrations without access to physical hardware.



Azure aws Google Cloud IBM Cloud



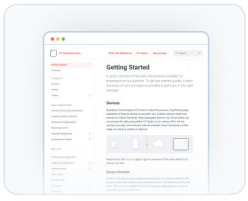
Designed in Norway, Manufactured in Europe

All our Wireless Sensors and Cloud Connectors are designed in Norway and manufactured in Norway or Germany.

We have created a tailor made, high volume manufacturing method that enables our ultra small size and low cost.

Ready to learn more?

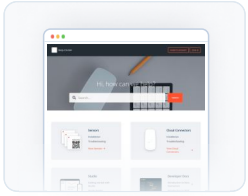
To learn more about DT's wireless sensor solution and how you can benefit from it, visit our website or schedule a demo with a member of our sales team at **https://www.disruptive-technologies.com/contact-us** or contact us directly via email at **sales@disruptive-technologies.com**



Developer Docs

Browse our developer documentation to find everything you need to know about the system, tutorials, integration guides, and API references.

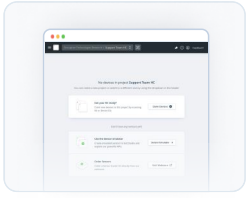
Learn more



Support Center

Browse our support center to find details about our products, technology, installation guidelines, and answers to frequently asked questions.

Learn more



Sign Up for Studio

Create a Studio account and test our software and API integrations using emulated sensor events.

Learn more

Revision History

Revision 1.0	**Change**: Initial release. **Date**: Mach 8th, 2022
Revision 1.1	**Change**: Updated document design and wireless range specification. **Date**: November 11th, 2022
Revision 1.2	**Change**: Updated heartbeat specification and added range estimate for Cloud Connector (2nd Gen). **Date**: May 28th, 2023
Revision 1.3	**Change**: Added overview and updated design **Date**: February 9th, 2024