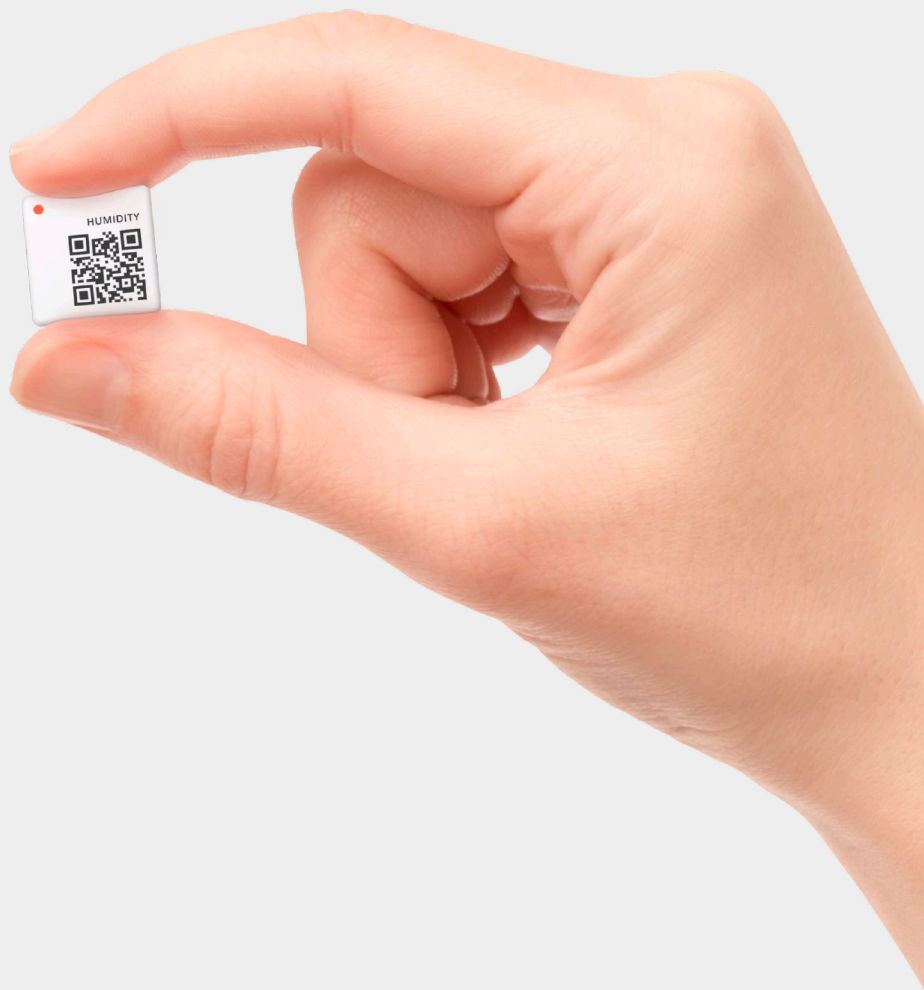




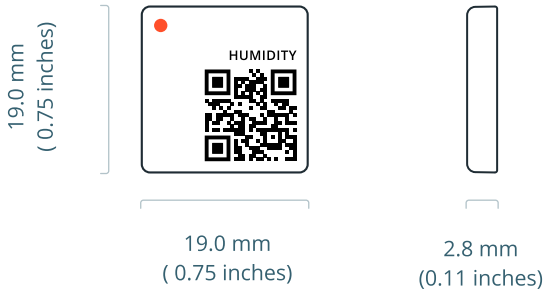
DISRUPTIVE
TECHNOLOGIES



Product Datasheet

Wireless Humidity Sensor

Overview



Description

The Wireless Humidity Sensor periodically measures relative humidity and temperature in the surrounding environment and wirelessly transmits the results to nearby Cloud Connectors at a predetermined interval.

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 climate monitoring
- Museum and art storage monitoring
- Agriculture/Greenhouse monitoring

Specifications

Measurements

Temperature	-40°C to 85°C / -40°F to 185°F
Humidity	0%-100% RH
Technology	CMOS

Battery Specification

Battery Type	Lithium
Battery Life	Up to 15 Years
Replaceable	No

Radio & Communication

Communication Protocol	SecureDataShot™
Radio Frequency	868 MHz / 915 MHz
Radio Range	Up to 40 m / 131 ft indoors

Mechanical Properties

Sensor Size	19x19x2.8 mm / 0.75x0.75x0.11 in
Weight	2.0 g (± 0.3 g) / 0.07 oz
IP Rating	IP68
Mounting Method	Adhesive

Product Name

Wireless Humidity Sensor EU

Wireless Humidity Sensor US

Region

Europe

North America

Product Number

102081

102087

How it works

Default Operation

The Wireless Humidity Sensor periodically measures relative humidity and temperature in the surrounding environment and wirelessly transmits the results to nearby Cloud Connectors at a predetermined interval.

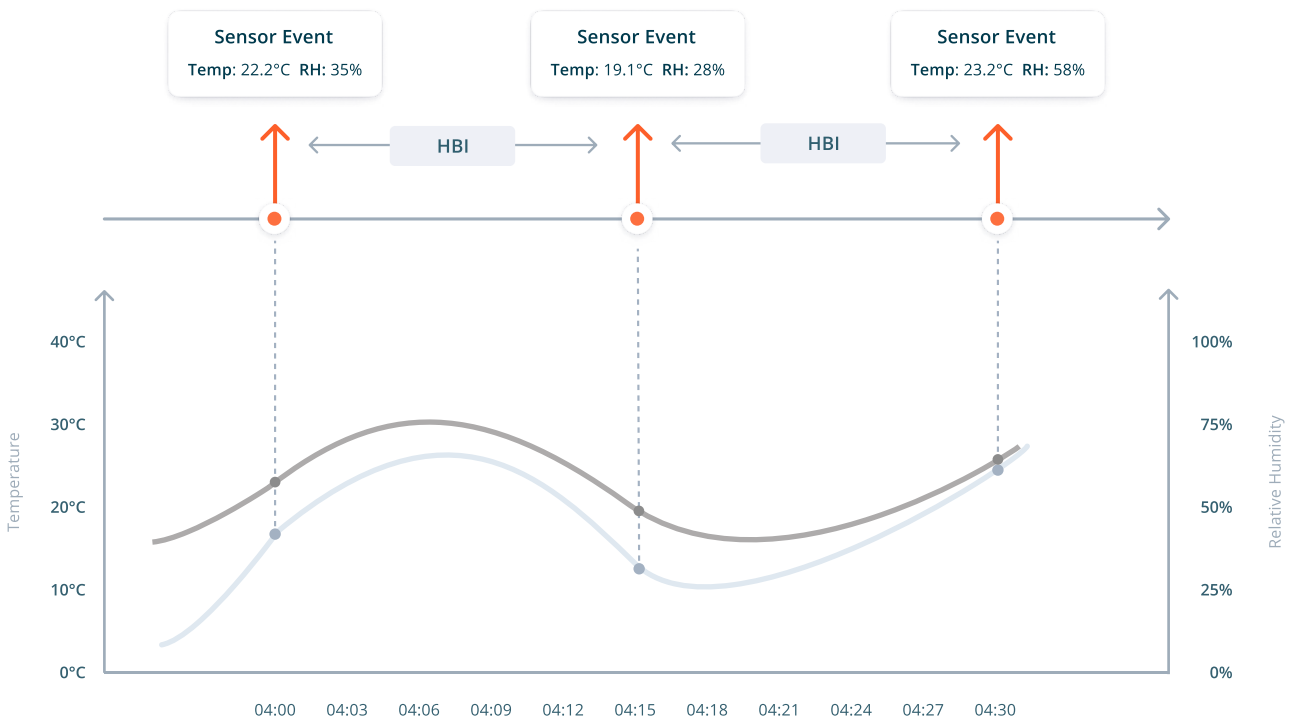
The radio protocol used is SecureDataShot™, and the data is relayed to DT cloud infrastructure using a SecureDataShot™ enabled gateway, also known as a Cloud Connector. From the cloud, the data can be viewed directly in Studio (web application) or sent to external services using webhooks or a REST API.

Measurement Interval

The time between measurements depends on the Heartbeat Interval (HBI).

Heartbeat Interval (HBI)

The Heartbeat Interval (HBI) controls how often data is sent to the cloud and can be set using Studio or the API. The Wireless Humidity Sensor can be set to 15, 30, 45, or 60-minutes.



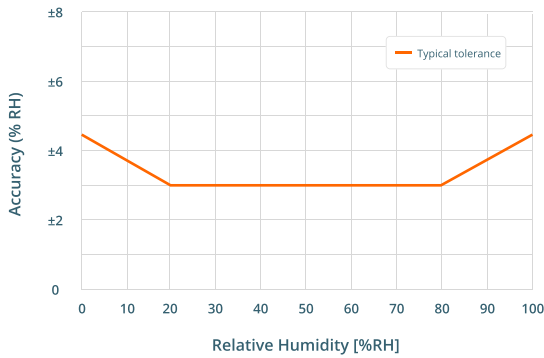
Sensor events with 15 minute heartbeat configuration

Technical Specification

Full Measurement Range	Humidity: 0-100%RH	Temperature: -40°C to 85°C (-40°F to 185°F)
Recommended Operating Range	Humidity: 20-80%RH	Temperature: 0°C to 50°C (32°F to 122°F)
Measurement Resolution	Humidity: 0.05% RH	Temperature: 0.05°C (0.09°F)
Sensor Technology	CMOS	

Sensor Accuracy The accuracy and response time of the sensor depends on the temperature and relative humidity in the environment.

Relative Humidity Performance @ 25°C



Temperature Range		Accuracy	
-25°C	-13°F	±1.0°C	±1.8°F
0°C	32°F	±0.5°C	±0.9°F
25°C	77°F	±0.4°C	±0.72°F
50°C	122°F	±0.4°C	±0.72°F
85°C	185°F	±0.9°C	±1.62°F

(1): The timestamps are sensitive to variations in temperature and the duration of the offline period.
For sensors in a stable temperature environment the typical accuracy is 1%.

Technical Specification

Operating & Storage Conditions

Operating Conditions **Temperature:** -40°C to 85°C (-40°F to 185°F) **Humidity:** 0 to 100% RH (non condensing)¹

Storage Conditions Cool and dry, near normal room temperature. To maximize battery life, DT recommends storing sensors within range of an online Cloud Connector.

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)				
Standalone Sensor	25 m	82 ft	300 m	984 ft
Sensor with range extender	100 m	328 ft	2 km	6561 ft
Cloud Connector (2nd Gen)				
Standalone Sensor	40 m	131 ft	600 m	1968 ft
Sensor with range extender	150 m	492 ft	4 km	13123 ft

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

Certification & Compliance

Certification EU: CE, UKCA, WEEE US/Canada: FCC, ISED
IC: 25087-100541 FCC ID: 2ATFX-100541

(1): The sensor is waterproof, but should not be used in applications where the sensor is submerged or exposed to extremely high humidity over prolonged periods of time. Long time exposure to water or humid air close to condensation, in particular in combination with elevated temperatures, will result in water ingress and reduced sensor lifetime.

Battery Specification

Battery

Chemistry: Lithium (Lithium Manganese Dioxide)

Lifetime

Standard Mode: Up to 15 years

High Power Mode: Up to 3 years

There are four factors that contribute the most to the battery life of the wireless sensor:

1. Temperature Conditions
2. Radio Transmissions
3. Sampling Interval
4. Operating mode

Temperature Conditions

The battery's ability to hold and deliver energy is affected by its operating temperature. At high temperatures, the battery will have increased self-discharge, and at low temperatures, it has less ability to deliver the total amount of its stored energy.

Radio Transmissions (Heartbeat)


The wireless sensor's most energy-consuming activity is transmitting and receiving radio messages. The average number of radio transmissions per day dramatically impacts the battery life, and the battery life increases by approximately three times by sending data every 15 minutes instead of every 5 minutes.

Sampling Interval

The sampling interval determines how often the temperature is measured, and when compared to the heartbeat interval, it has a negligible impact on the battery life. However, if the sampling rate is set to a very short interval, it can have a noticeable effect at some temperatures over many years of operation.

Operating Mode

The sensor automatically selects and switches between the two following modes to optimise range and battery life:

- **Standard Mode** (default)
- **High Power Boost Mode** (redundancy mode) 

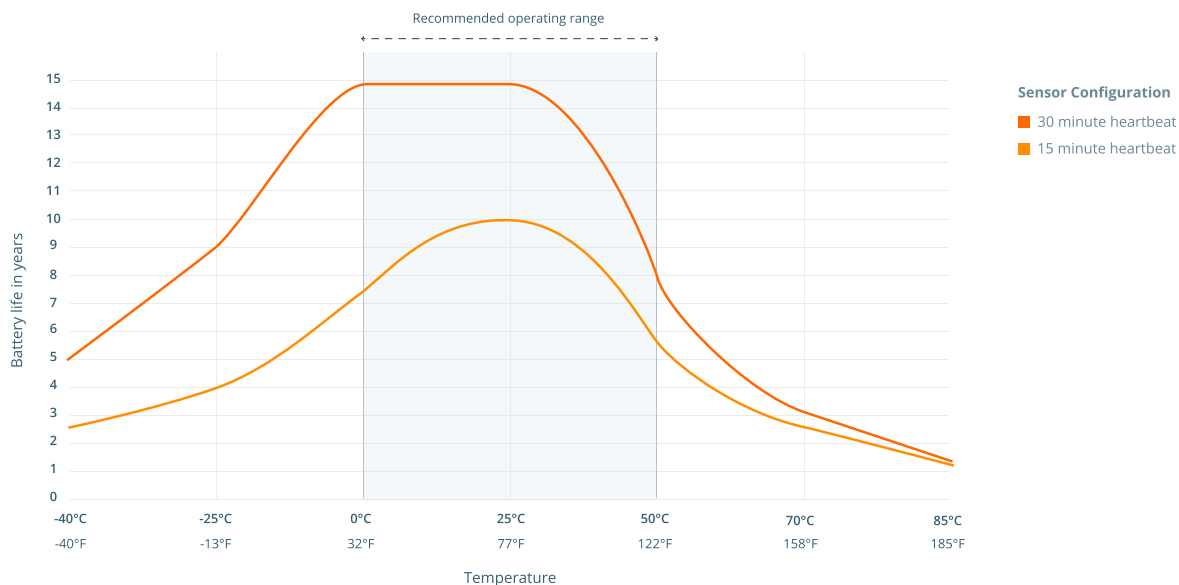
In Standard Mode, when the sensor transmits a message, it expects to receive a message back from the cloud acknowledging that the sensor message has been received.

As a redundancy feature, if there is something preventing the message from reaching the cloud, the sensor will re-transmit the message using more power, in what is called High Power Boost Mode.

High Power Boost Mode gives the sensor increased wireless range, at the expense of battery life. To extend the battery life, sensors should not be permanently operating in High Power Boost Mode. The sensor uses roughly 3x the amount of energy to use the radio in High Power Boost Mode vs Standard Mode.

To make it easy for users to see if a device is currently operating in Standard Mode or High Power Boost Mode, the mode is sent with each sensor event on the API and visible in the Studio user interface.

The graph below shows the expected battery life across multiple temperatures and sampling rates at 5 min, 15 min and 30 minute heartbeat intervals.



Please note: The battery lifetimes listed here are estimates and can vary from sensor to sensor depending on usage pattern, wireless coverage and other environmental variables.

Mechanical Properties

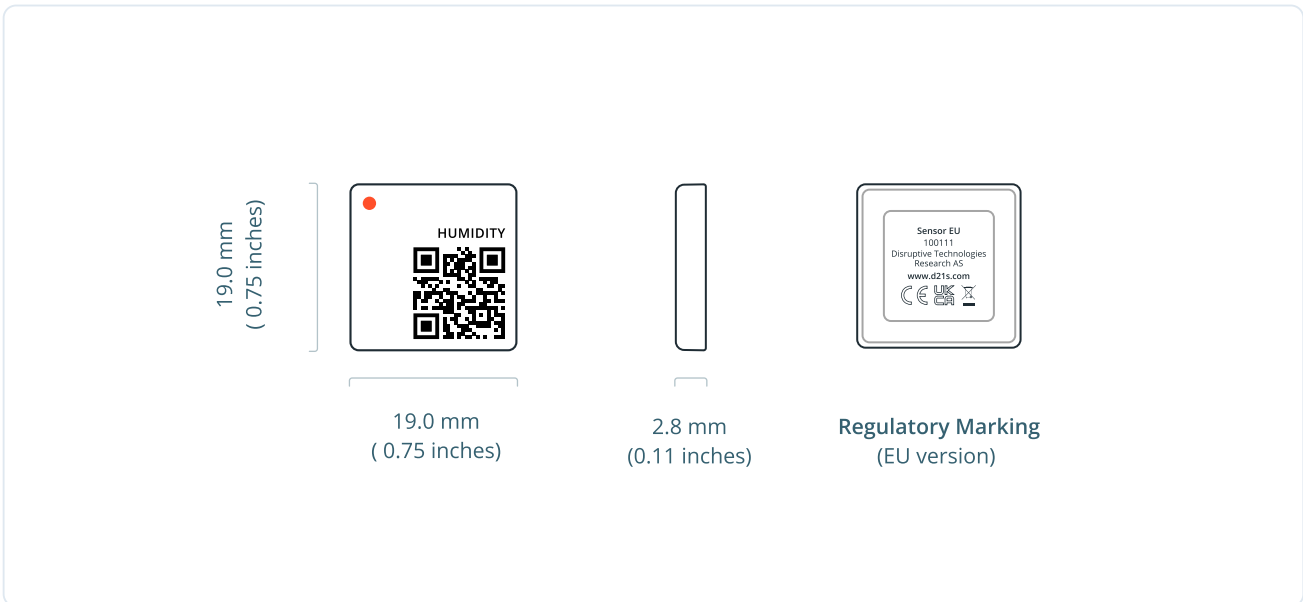
Size 19 x 19 x 2.8 mm (± 0.2 mm) / 0.75 x 0.75 x 0.11 inches

Weight 2.0 g (± 0.3 g) / 0.07 oz

Material Impact modified acrylic film

Mounting method Adhesive

IP Rating IP68



Product Variants

EU Version

Product Number: 102081

Region: Europe

US Version

Product Number: 102087

Region: North America

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Installation Guidelines



Step 1
Clean the surface to ensure good sensor adhesion







Step 2
Peel the protective film from the back of the sensor



Step 3
Attach the sensor to the surface and press for 10 seconds

Check sensor coverage

  If the sensor is **not reporting data**, the sensor is outside the range of the Cloud Connector. Move the Cloud Connector or install a second Cloud Connector to extend the coverage.

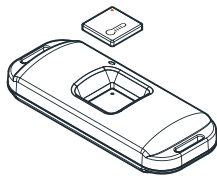
  If a sensor is in **High Power Boost Mode**, the battery life will be reduced because the sensor is using more energy to reach the Cloud Connector. Either move the Cloud Connector or consider using a Range extender accessory to amplify the sensor range.

Please note before attaching the sensor

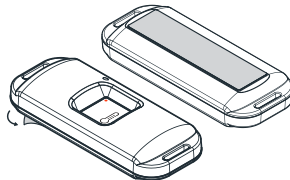
- Installing the sensor directly on a metal surface will reduce the wireless range.
- The sensor should not be placed near a magnet. It can severely affect functionality and battery life.

Installation with Ambient Range Extender

Range Extender accessories can be used to increase the range of the radio signal of the sensor by as much as 4x. The Ambient Range Extender (PN: 101693) allows installation directly on metal surfaces and is designed to work in environments that typically attenuates radio signals a lot, like refrigerators, freezers and ducts.

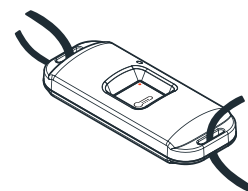


Orientation matters – Make sure the dot on the sensor is aligned with the dot on the range extender.



Option 1 – Use the adhesive on the back to attach the range extender in the desired location.

Or



Option 2 – Use zip ties to attach the range extender in the desired location.

Ordering Information

Europe

Product Name	Order Code	Region	Quantity
Wireless Humidity Sensor EU	902081	Europe	1
Wireless Humidity Sensor EU - 25 kit	102083	Europe	25
Wireless Humidity Sensor EU - 100 kit	102269	Europe	100

North America

Product Name	Order Code	Region	Quantity
Wireless Humidity Sensor US	902087	North America	1
Wireless Humidity Sensor US - 25 kit	102089	North America	25
Wireless Humidity Sensor US - 100 kit	102313	North America	100

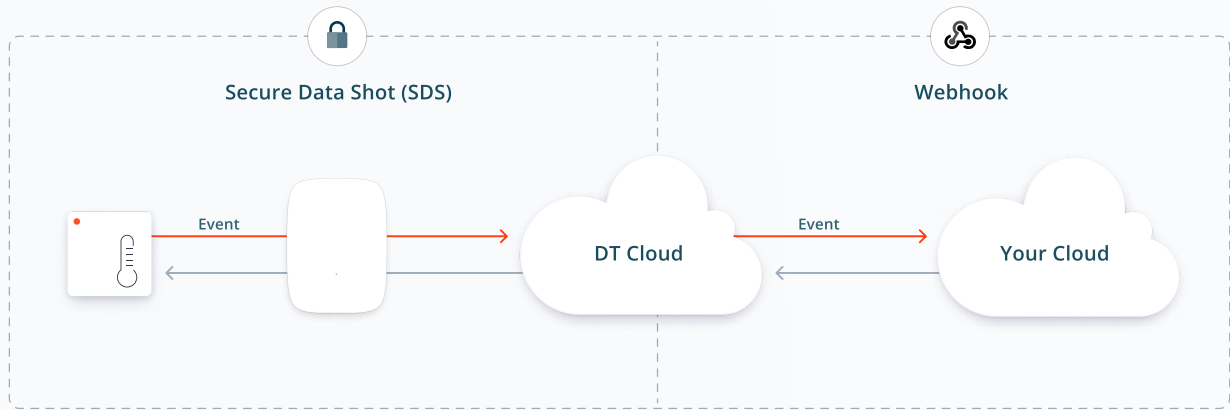
Sensor Accessories (optional)

Product Name	Order Code	Region	Quantity
Ambient Range Extender	101693	Global	1

Sensor Subscription (mandatory)

Name	1 Year	3 Year	5 Year
Sensor Subscription - Humidity	800004	800005	800006

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

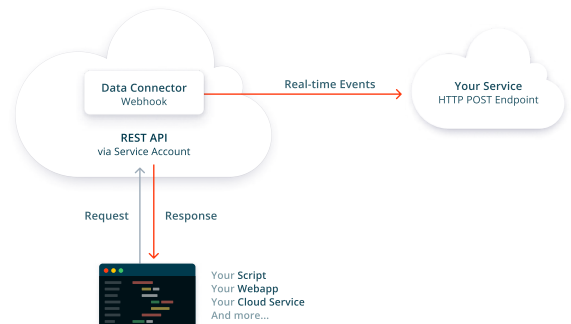
All Disruptive system components are instrumented and monitored 24 hours per day, 7 days per week. Anomalies trigger alarms and notifies our response team.

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.

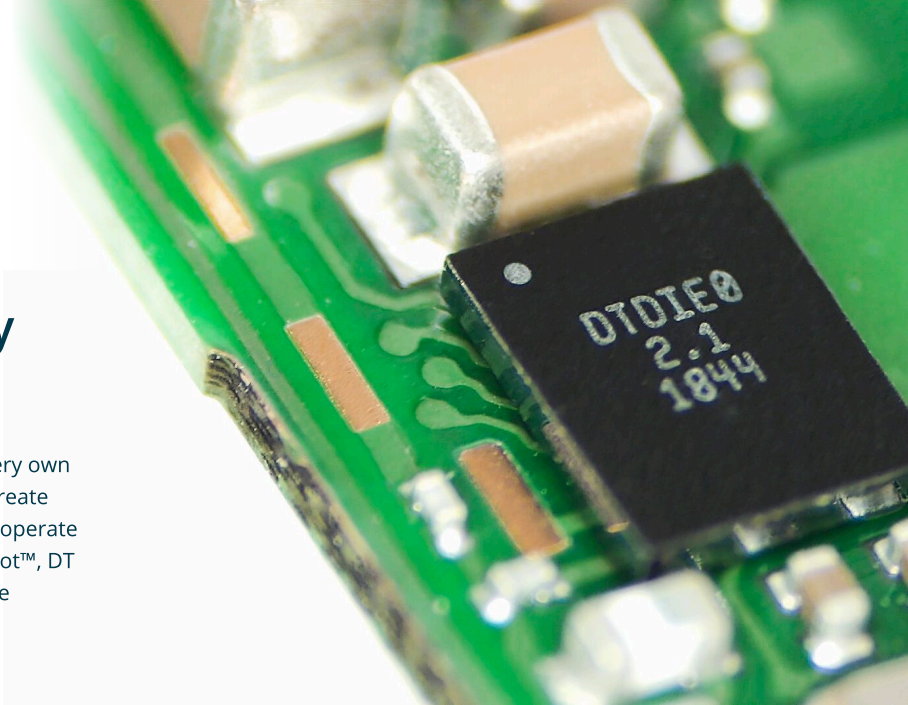


REST API & Webhooks

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.



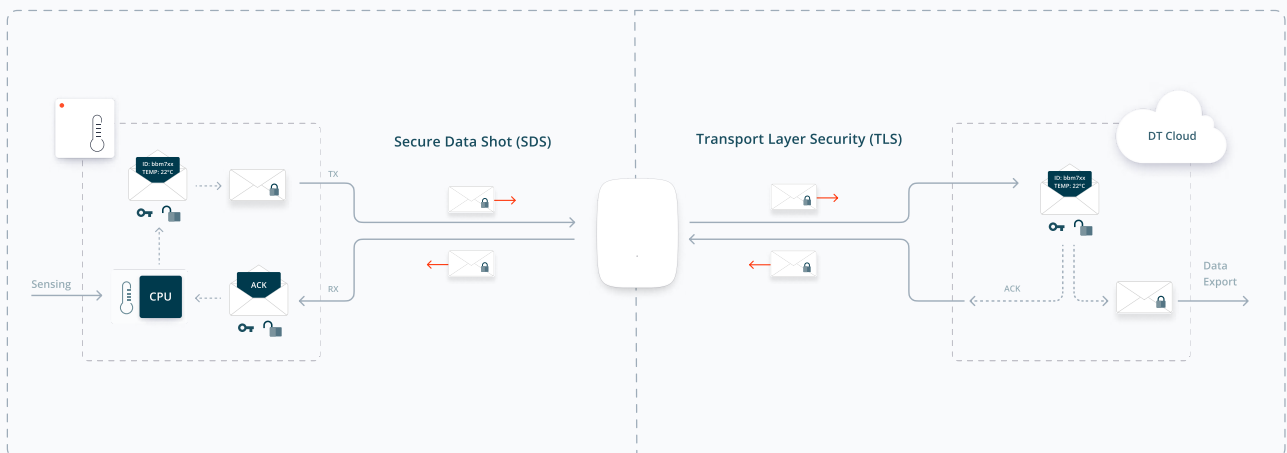
- Enables tiny sensors with long battery life
- Tailor made for the SecureDataShot™ protocol

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.

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.

- 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 asymmetric 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.
- 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

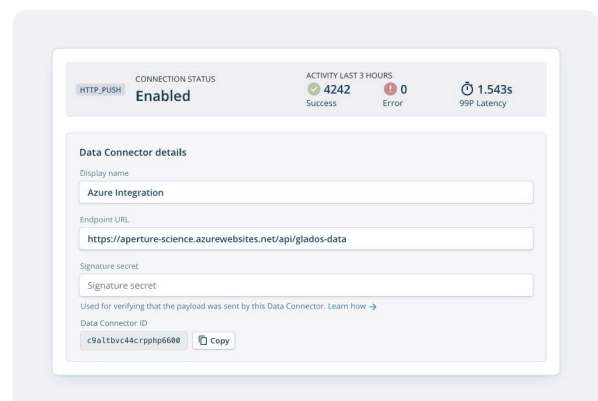
Easily configure secure webhooks to forward the data to your own service.

Service Accounts

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

Sensor Emulators

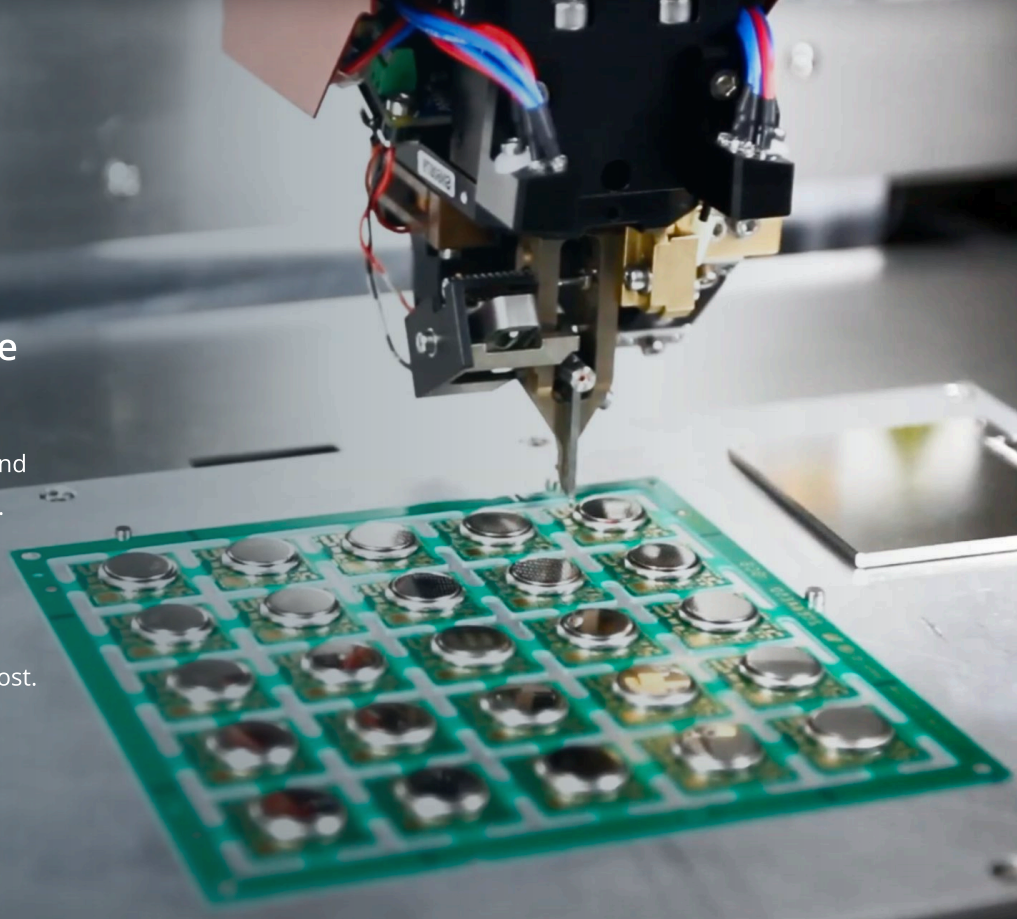
Create emulated sensors to test your API integrations without access to physical hardware.



Designed in Norway, Manufactured in Europe

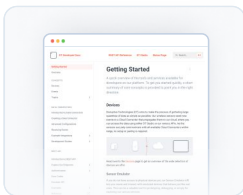
All our Wireless Sensors and Cloud Connectors are designed in Norway and manufactured in Norway or Germany.

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



Ready to learn more?

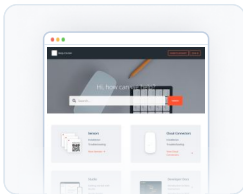
To learn more about DT's wireless sensor solution and how you can benefit from it, visit our website or schedule a demo with a member of our sales team at <https://www.disruptive-technologies.com/contact-us> or contact us directly via email at sales@disruptive-technologies.com



Developer Docs

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

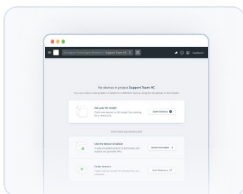
[Learn more](#)



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: February 5th, 2021

Revision 1.1

Change: Updated to new data sheet design with additional information.

Date: May 1st, 2023

Revision 1.2

Change: Added overview page and updated design

Date: February 9th, 2024

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