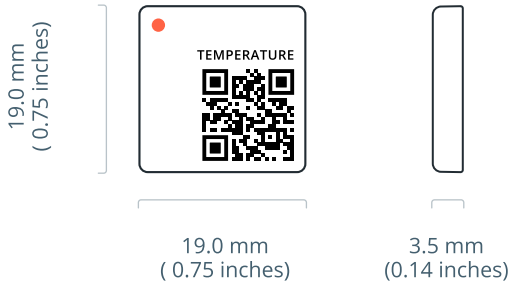
DISRUPTIVE
TECHNOLOGIES

Product Datasheet

Wireless Temperature Sensor

Rev 1.0

Overview



Description

The Wireless Temperature Sensor periodically measures the 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

- Refrigerator Temperature Monitoring
- Freezer Temperature Monitoring
- Incubator / Hot-hold monitoring
- HVAC Monitoring

Specifications

Temperature Measurement

Measurement Range	-40 to +85°C / -40 to +185°F
Accuracy	± 0.25°C / ± 0.45°F*
Technology	CMOS

*See Sensor Accuracy (Page 4)

Battery Specification

Battery Type	Lithium (Poly-Carbon Monofluoride)
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	19x19x3.5mm / 0.75x0.75x0.14 in
Weight	3.0 g (± 0.5 g) / 0.11 oz
IP Rating	IP68
Mounting Method	Adhesive

Product Name	Region	Product Number
Wireless Temperature Sensor EU	Europe	102739
Wireless Temperature Sensor US	North America	102740
Wireless Temperature Sensor with Data Backfill EU	Europe	102683
Wireless Temperature Sensor with Data Backfill US	North America	102685

How it works

Default Operation

The Wireless Temperature Sensor periodically measures the temperature in the surrounding environment and wirelessly transmits the results to nearby Cloud Connectors at a predetermined interval. The temperature measurement interval can be configured to as low as every 30 seconds.

The radio protocol used is SecureDataShot™, and the data is relayed to DT Cloud 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

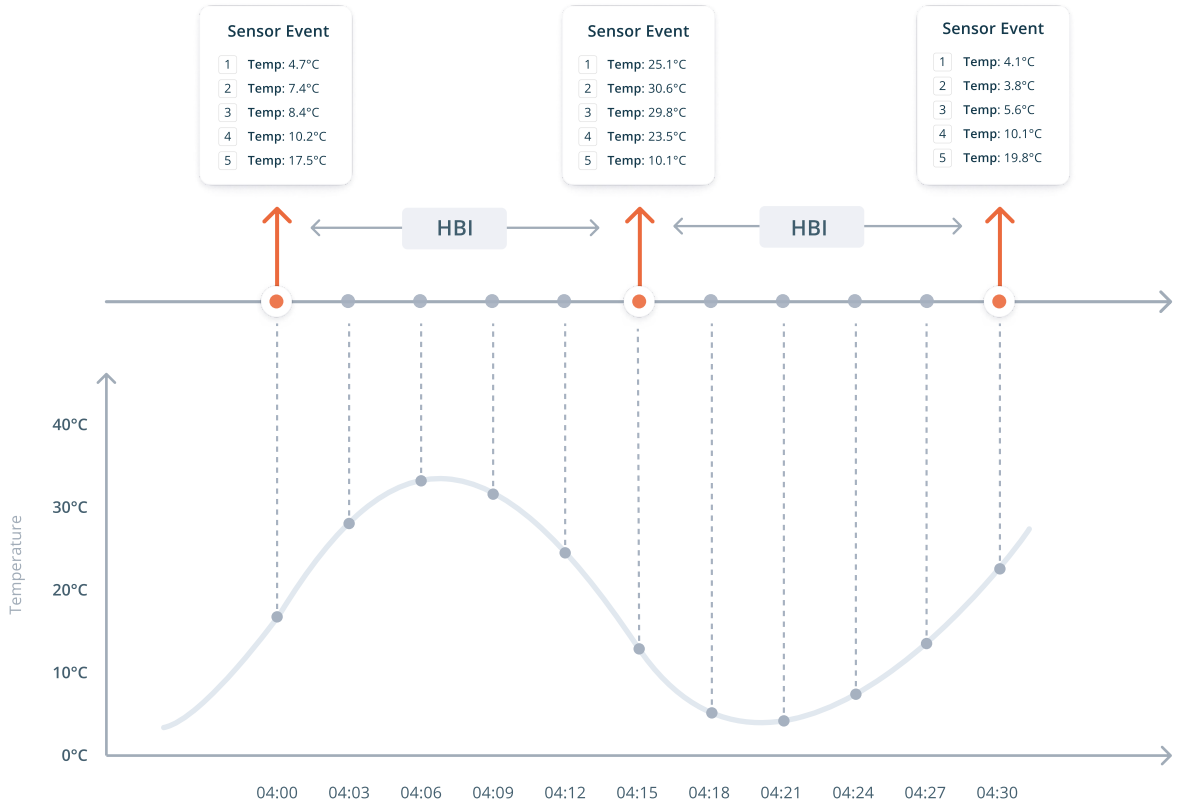
The time between measurements depends on the Heartbeat Interval (HBI) and the number of samples in each heartbeat.

Users can adjust the sensor to capture 1 to 30 samples during a single heartbeat. The table to the right displays the shortest measurement interval for different heartbeat intervals.

HBI	Measurement Interval
5 min	30 sec
15 min	30 sec
30 min	60 sec
45 min	90 sec
60 min	120 sec

Heartbeat Interval

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



Sensor events during default operation with 3 minute measurement interval and 15 minute heartbeat

Technical Specification

Measurement Range

-40°C to 85°C (-40°F to 185°F)

Sensor Technology

CMOS

Sensor Accuracy

The accuracy of the sensor depends on the temperature. See the table underneath for typical accuracy at specific temperatures.

Temperature Range		Typical		Max	
-40°C to -25°C	-40°F to -13°F	±0.6°C	±1.08°F		
-25°C to 0°C	-13°F to 32°F	±0.3°C	±0.54°F		
0°C to 60°C	32°F to 140°F	±0.2°C	±0.36°F	±0.7°C	±1.26°F
15°C to 45°C	59°F to 113°F	±0.2°C	±0.36°F	±0.4°C	±0.72°F
45°C to 85°C	113°F to 185°F	±0.3°C	±0.54°F		

By calibrating the sensors the accuracy can be improved to ±0.25°C, see the “Calibration Service” section for more information.

Measurement Resolution

0.05°C / 0.09°F

Temperature Drift

0.04°C / 0.072°F per year (max)

Data backfill (optional)

If the sensor goes offline, it will start storing temperature measurements locally until the connection to the cloud is restored. The sensor will backfill data, starting with the most recent samples first. The sensor will overwrite the oldest data if the memory becomes full. The number of datapoints that can be stored in an offline period depends on the sampling rate, heartbeat configuration and temperature fluctuations.

Offline storage: Up to 100,000 datapoints

Timestamp accuracy[1]: 1%

Practical example: A sensor with 15 minute heartbeat and 30 second sampling rate in a stable temperature environment can store data for 1 month before it starts overwriting data.

Calibration Service (optional)

Wireless Temperature Sensors can be calibrated by DT for improved and documented accuracy. The setup meets the requirements of traceability stated in the ISO 17025:2017 standard. The sensors are calibrated to ±0.25°C / ± 0.45°F in a 5-point calibration routine (-20°C to 50°C) and delivered with a digital downloadable calibration certificate.

Contact sales at sales@disruptive-technologies.com for more information.

(**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[1]

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

EN12830 Compliance (valid for sensors with data backfill and calibration certificate)

Accuracy Class	0.5 in the range -30°C to 55°C
Software Verification Level	Class III Type B (according to WELMEC 7.2) (EN12830:2018-10)
Test Report Number	ATP-MUC 1132 TS

(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 (Poly-Carbon Monofluoride)	
Lifetime	**Standard Mode**: Up to 15 years	**High Power Mode**: Up to 5 years

There are four factors that contribute the most to the battery life of the wireless sensor: temperature conditions, radio transmissions, sampling interval, and 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.

Environments with rapid, repeated temperature changes can significantly reduce sensor life. Cycles that swing from cool/ambient conditions to above ~60°C (140°F) are especially demanding. Such cycling accelerates battery self-discharge and material fatigue, increasing the likelihood of intermittent operation and early failure.

Radio Transmissions

The wireless sensor's most energy-consuming activity is transmitting and receiving radio messages. The average number of radio transmissions per day impacts the battery life.

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:

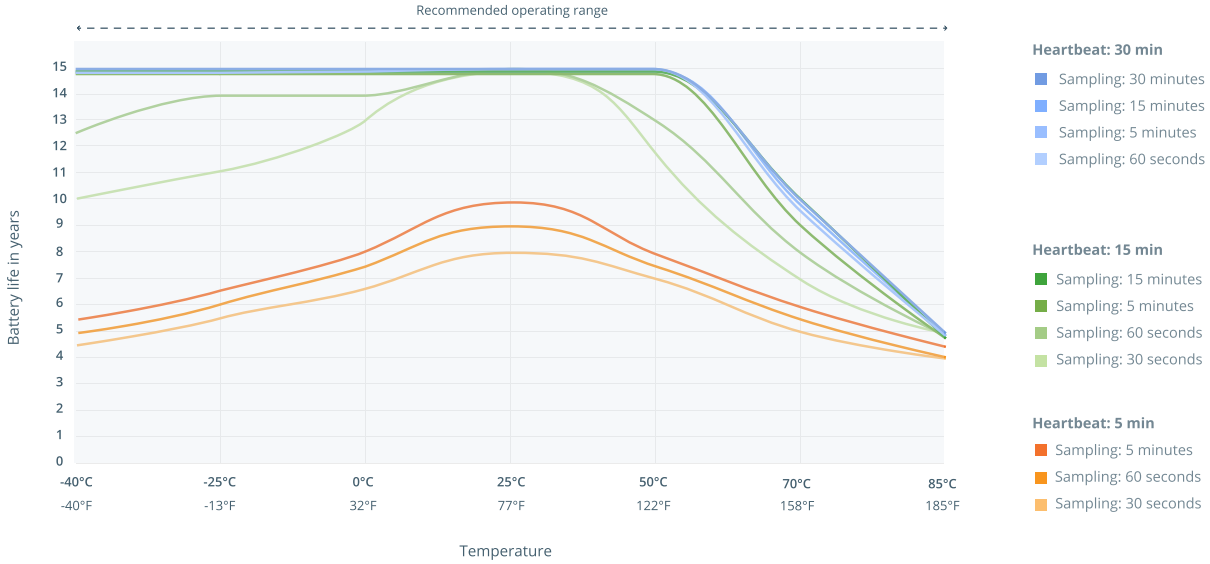
- **Standard Mode** (default)
- **High Power Boost Mode** (redundancy mode)

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.

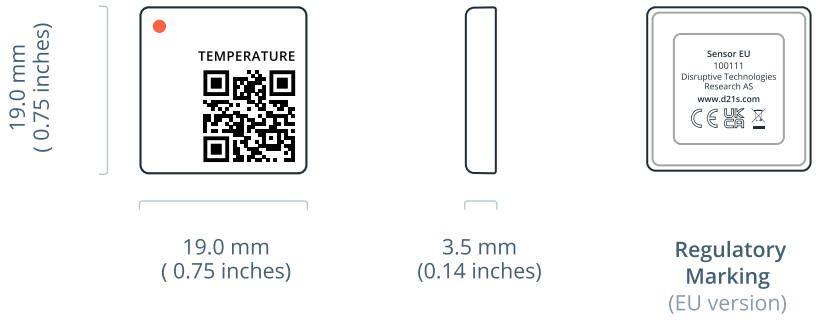
To make it easy for users to see if a device is currently operating in Standard Mode or High Power Boost Mode, the mode is sent with each sensor event on the API and visible in the Studio user interface.



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 3.5 mm (± 0.2 mm) / 0.75 x 0.75 x 0.14 inches
Weight	3.0 g (± 0.5 g) / 0.11 oz
Material	Impact modified acrylic film
Mounting method	Adhesive
IP Rating	IP68



Product Variants

EU version	**Product Number:** 102739	**Region**: Europe
EU version (with Data Backfill)	**Product Number**: 102683	**Region**: Europe
US version	**Product Number:** 102740	**Region**: North America
US version (with Data Backfill)	**Product Number**: 102685	**Region**: North America

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.

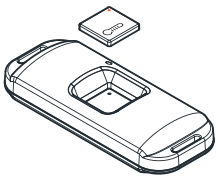
If a sensor is in **Boost Mode**, the battery life will be reduced because the sensor is using more energy to reach the Cloud Connector. Either move the Cloud Connector or consider using a Range extender accessory to amplify the sensor range.

Please note before attaching the sensor

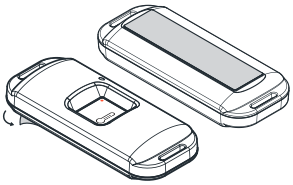
- Installing the sensor directly on a metal surface will reduce the wireless range.
- The sensor should not be placed near a magnet. It can severely affect functionality and battery life.

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.

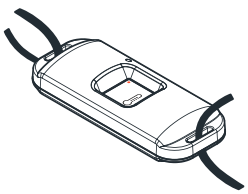


Orientation matters – Make sure the dot on the sensor is aligned with the dot on the range extender. Press the sensor into the range extender for 10 seconds.



Option 1 – Use the adhesive on the back to attach the range extender in the desired location. Press the range extender onto the surface for 10 seconds.

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 Temperature Sensor EU	902739	Europe	1
Wireless Temperature Sensor EU - 25 kit	102741	Europe	25
Wireless Temperature Sensor EU - 100 kit	102742	Europe	100
Wireless Temperature Sensor with Data Backfill EU	902683	Europe	1
Wireless Temperature Sensor with Data Backfill EU - 25 kit	102687	Europe	25
Wireless Temperature Sensor with Data Backfill EU - 100 kit	102688	Europe	100

North America

Product Name	Order Code	Region	Quantity
Wireless Temperature Sensor US	902740	North America	1
Wireless Temperature Sensor US - 25 kit	102743	North America	25
Wireless Temperature Sensor US - 100 kit	102744	North America	100
Wireless Temperature Sensor with Data Backfill US	902685	North America	1
Wireless Temperature Sensor with Data Backfill US - 25 kit	102690	North America	25
Wireless Temperature Sensor with Data Backfill US - 100 kit	102689	North America	100

Calibration Service (optional)

Product Name	Order Code	Region	Quantity
Calibration Service & Certificate	800032	Global	1

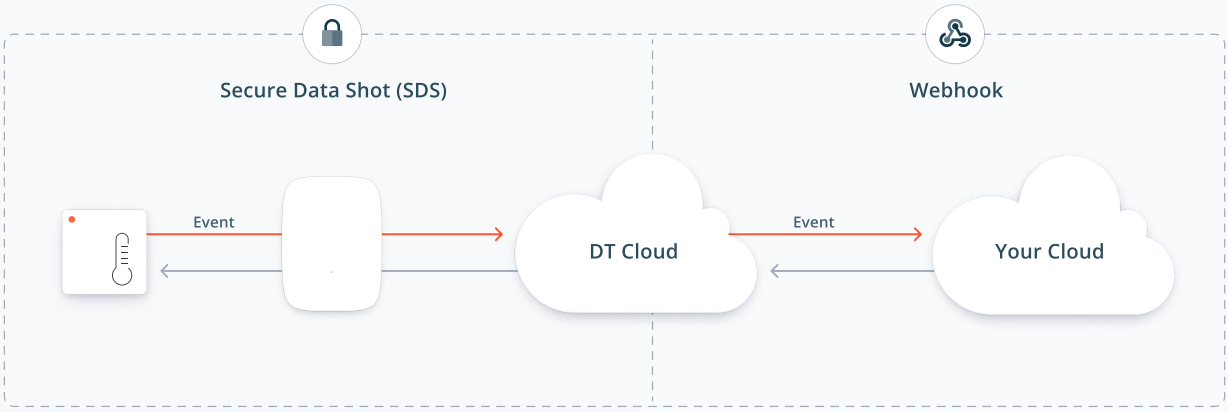
Sensor Accessories (optional)

Product Name	Order Code	Region	Quantity
Ambient Range Extender	101693	Global	1
Pipe Range Extender	101702	Global	1

Sensor Subscriptions (mandatory)

Name	1 Year	3 Year	5 Year
Sensor Subscription - Temperature	800001	800002	800003

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

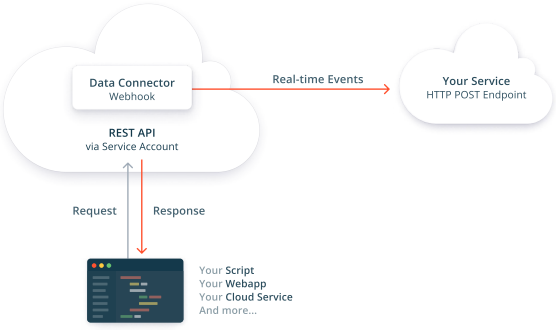
All Disruptive system components are instrumented and monitored 24 hours per day, 7 days per week. Anomalies trigger alarms and notifies our response team.

Easy to Scale

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

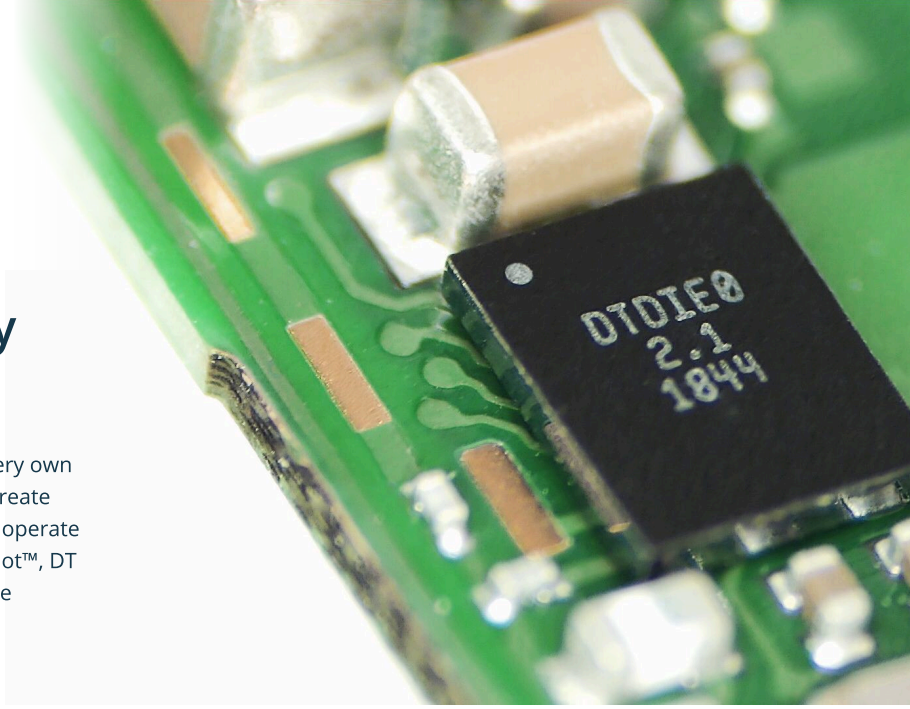
Centralized Management

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

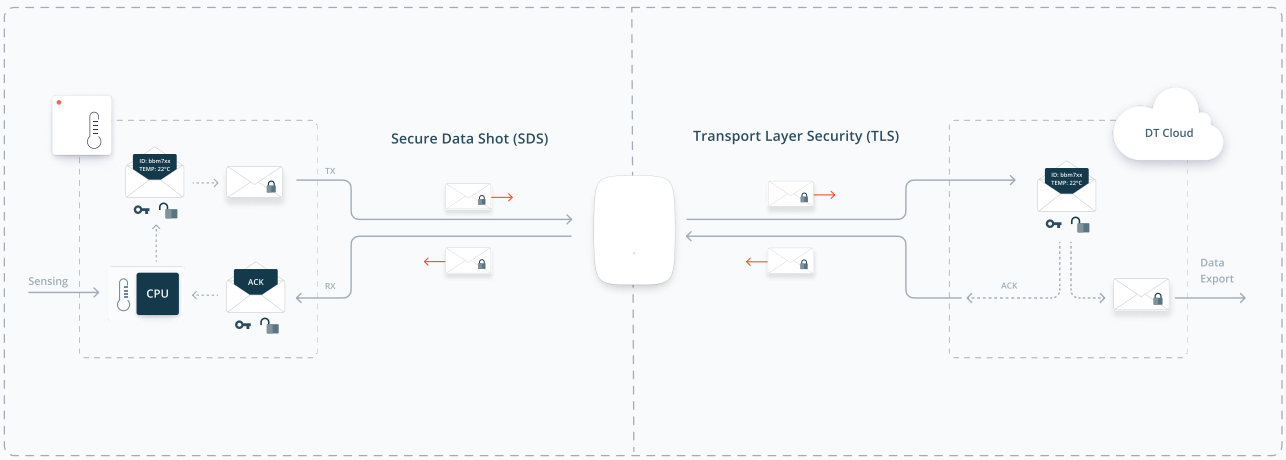
Secure by default with SecureDataShot™

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

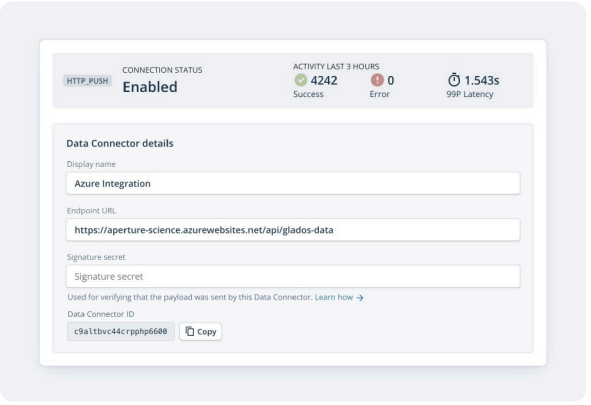
Easily configure secure webhooks to forward the data to your own service.

Service Accounts

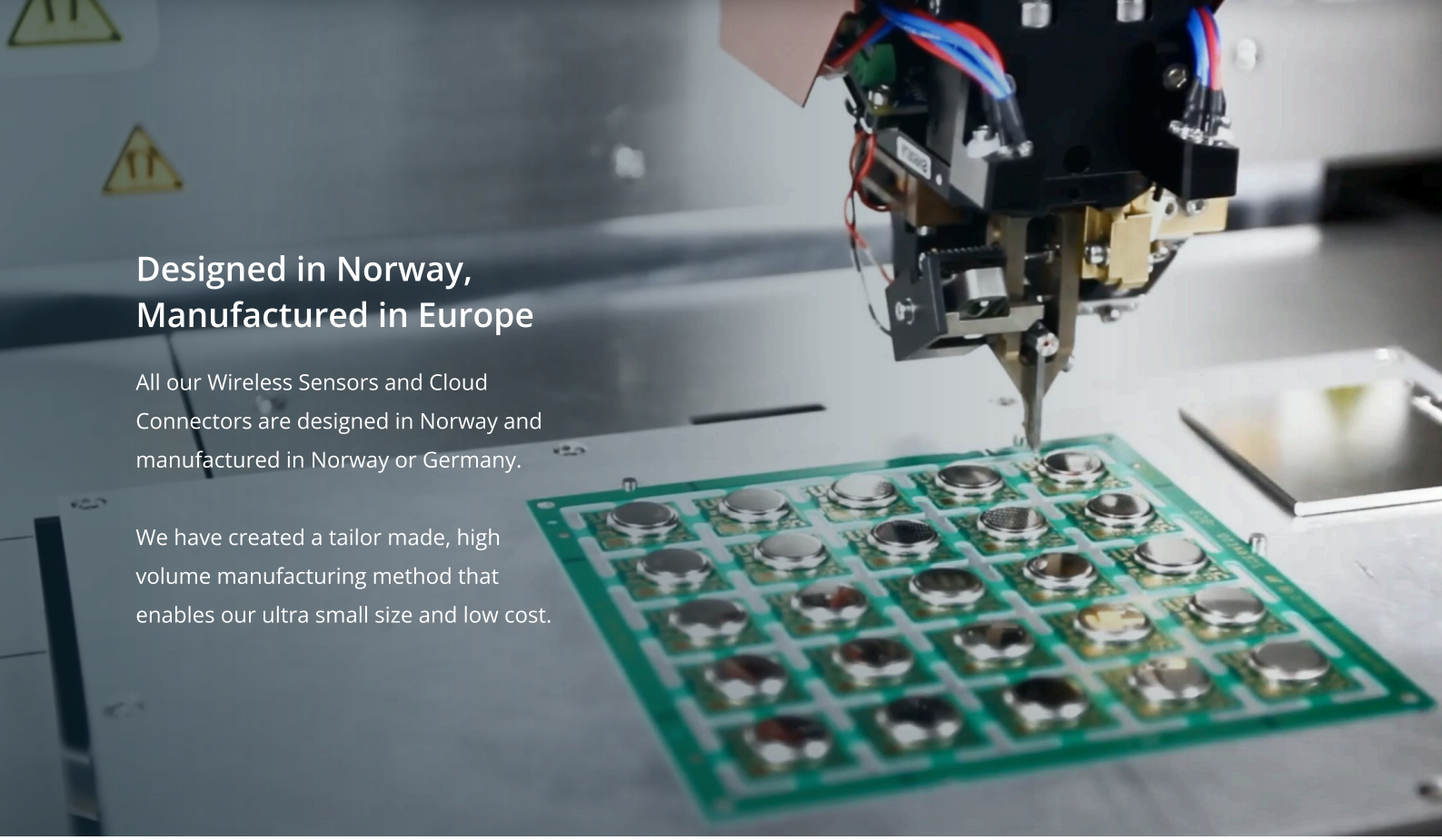
Create and manage role-based service accounts to let your own cloud service authenticate with the REST API.

Sensor Emulators

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



Azure aws Google Cloud IBM Cloud



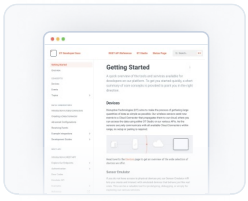
Designed in Norway, Manufactured in Europe

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?

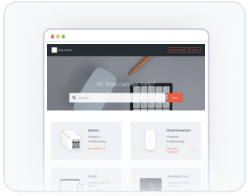
To learn more about DT's wireless sensor solution and how you can benefit from it, visit our website or schedule a demo with a member of our sales team at **https://www.disruptive-technologies.com/contact-us** or contact us directly via email at **sales@disruptive-technologies.com**



Developer Docs

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

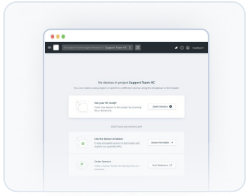
Learn more



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**: February 9th, 2024
Revision 1.1	**Change**: Added section about temperature cycling and updated calibration info. **Date**: September 9th, 2025

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