ADVENTUM TECH

Product Manual

TempSense Pro

Concrete Temperature & Maturity Monitoring

Product code TSPRO-01-01

OVERDESIGN

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SAFETY EXCELLENCE

CE RoHS compliant

Product Overview

TempSense Pro is a fully wireless, single-use concrete temperature and maturity sensor developed by Adventum Tech for real-time monitoring of freshly cast concrete. Designed for single-point measurement, the sensor is embedded directly into concrete during casting and
provides continuous temperature data throughout the curing process. Using ASTM C1074 maturity methodology, TempSense Pro enables accurate concrete strength prediction, optimised construction scheduling, and risk reduction for early loading and formwork removal.





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System Components

The TempSense Pro monitoring system consists of the following main components:

1) TempSense Pro: 10 x sensor pack
2) Wireless Gateway
3) Protective casing: Provides mechanical protection during installation and construction activities.
4) Solar (PV) charging option: Enables battery recharging and extends operational lifetime for long-term monitoring deployments.

Communication Protocol

TempSense Pro supports the following communication technologies:

1) LoRa: Low-power, long-range wireless communication suitable for construction sites with limited infrastructure.
2) 4G / LTE Cellular Communication: Enables real-time data transmission via existing mobile networks, depending on local coverage.

The communication method is selected based on project requirements and site conditions.

Software Integration

TempSense Pro integrates with **adventum.tech**, Adventum Tech's cloud-based analytics platform. Key software capabilities include:

1) Real-time temperature monitoring
2) Concrete maturity calculation (Nurse–Saul method)
3) Concrete strength estimation based on laboratory-defined curves
4) Project-based dashboards
5) Data visualization and analytics
6) Exportable **PDF reports** for quality assurance and documentation

Safety and Handling

To ensure reliable operation and accurate measurements, observe the following precautions:

1) Do **not** submerge the sensor in water
2) Do **not** drop the sensor from height
3) Do **not** crush, sharply bend, or pull sensor cables
4) Do **not** modify hardware, connectors, or internal components
5) Do **not** expose connectors to wet concrete or aggressive chemicals

Improper handling may result in sensor damage or inaccurate data.

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Installation overview

Step 1 – Unboxing
Carefully unbox the TempSense Pro box with 10 x sensor and verify that all ordered components and accessories are included.

Step 2 – Gateway set up
Carefully unbox the Adventum Tech Gateway.

Gateway comes with no batteries, therefore batteries must be inserted to activate the system:

a) Carefully remove the protective cover from the Gateway
b) Unscrew enclosure lid
c) Carefully open the Gateway cover
d) Unscrew the battery holder cover
e) Input 1 – 4 pcs of 18650BD (Li-Ion) batteries. Input (-) and (+) polarities correctly.
f) Place and screw the battery holder back
g) Carefully close the Gateway cover
h) Screw the enclosure lid
i) Start the Gateway – instructions of its activation are next to the ON/OFF button.

Step 3 – Gateway Mounting
Mount the Gateway on a rigid and stable surface, such as a railing, safety fence, or other suitable fixed structure near the monitoring area.

Secure the Gateway firmly using the Velcro fasteners located on the back of the unit.

Install the Gateway in the correct vertical orientation, with the activation button facing downward. Ensure that the unit is securely fixed and will not move or change position during construction activities.

Step 4 – TempSense Pro Activation
To activate the TempSense Pro sensor, take the supplied magnet and slowly slide it from the top of the sensor toward the activation button.

When the sensor has been successfully activated, the red LED indicator will blink, confirming that the TempSense Pro is switched on and ready to establish communication with the Gateway.

Step 5 – System Verification
It is highly recommended to activate the TempSense Pro sensor and Gateway several hours before the concrete pour. This allows sufficient time for the system to establish communication, synchronize, and verify successful data transmission.

Before concreting begins, confirm that the sensor is online and measurement data is being received correctly on the Adventum Tech portal.

Do not proceed with sensor installation into concrete until successful data transmission has been verified.

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Step 6 – Concrete Casting
Install all prepared monitoring points in their designated locations before starting the concrete pour.

During installation and concreting, ensure that all sensor cables remain correctly positioned, securely fixed, and protected from displacement or damage.

Important: The TempSense Pro antenna must always face upward. Preferably, secure the antenna to the top reinforcement layer, with the minimum practical concrete cover above the antenna, while maintaining the required structural concrete cover.

Proceed with the concrete pour carefully, ensuring that the sensors, cables, and antennas remain in their intended positions throughout the pouring and compaction process.

Step 7 – Start Monitoring
Activate the casting in the adventum.tech platform and begin real-time monitoring.

Analytics activation

To launch a concrete maturity development monitoring process, follow 7 simple steps:

1) Log in to your company's designated account
2) Create and manage users (Admin, View, Edit roles as required)
3) Create a new project
4) Assign the TempSense Pro sensors to the project
5) Create a concrete recipe using:
   - Nurse–Saul concrete maturity method
   - Strength–maturity data from laboratory tests or concrete supplier
6) Create and start a casting
7) Monitor data and generate PDF reports

User Responsibility

The user is solely responsible for the accuracy, completeness, and correctness of all concrete mix information, laboratory test results, maturity calibration data, and strength parameters entered into the Adventum Tech platform.

Adventum Tech provides the monitoring system, data acquisition, processing, visualization, and analytical tools. Adventum Tech does not assume responsibility for inaccurate, incomplete, or incorrectly entered input data, nor for engineering decisions or actions made based on such incorrect information.

All engineering decisions should be made by appropriately qualified and authorized personnel in accordance with applicable project requirements, standards, and regulations.

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Key Features

- Fully wireless, single-use sensor
- Single-point monitoring for standard concrete elements
- ASTM C1074 compliant maturity and strength prediction
- Real-time monitoring and advanced analytics

Measured Parameters

- Temperature
- Concrete age, h
- Concrete maturity
- Concrete strength, mPA

Construction Applications

- Mass concrete pours
- Bridge foundations and piers
- Tunnels and underground structures
- Large slabs and raft foundations
- Critical infrastructure elements requiring thermal gradient análisis
- Slabs, walls, beams, columns, foundations
- Cold and hot weather concreting
- In-situ and precast concrete elements

Software & Data Integration[5]

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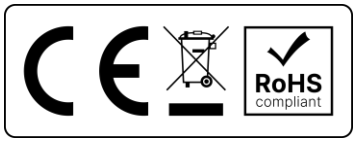
Construction Applications

- Real-time structural behaviour visualisation
- Automated analytics and alerts
- Secure cloud-based data storage
- Project-specific dashboards
- Exportable reports for QA, compliance, and asset documentation
- API and third-party software integration









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Technical Specifications

Sensor Type: TempSense Pro Sensor Specification		
Parameters details		
Type		Digital Thermal Chip
Internal memory	256 kB	GW 32GB
Power/Battery	19 Ah EVE D	
TempSense Pro Technical Specification		
Parameters details		
Accuracy (Temperature range -20° to +80°)	°, Celsius degree	±0.5°
Resolution		0.1°
Range		-40 to +125°
Physical Specification		
Parameters details		
Dimensions	mm	60 x 32 x 10
Weight/Mass	g (kg)	50g
Protection		Potted, Waterproof
Material		PETG
Operating Temperature Range		Thermocouple: -40° +125°
		Battery: -20° + 60°
Radio Specification		
Parameters details		
Range (estimation for urban and rural environment)		
Urban		0 - 1km
Sub-urban		1 - 3 km
Open space		3 - 5km
Fequency		868 MHz / 915 MHz
Data Transmission		Lora / LTE 5G
Configuration		Star Topology (Point to Point)
Battery Life (*estimation for static monitoring)		
Parameters details		
15 min		2 month

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