

# ThermalTrace

## Wireless Temperature Monitoring System for Cooking and Cooling

REDUCE WASTE AND THE NEED FOR RE-COOKING



# ThermalTrace

## About

ThermalTrace is designed as a predictive temperature monitoring system for the food industry. It is a batch based wireless data acquisition system that monitors from oven to blast. It allows operators to know the temperature for the entire cooking cycle.

It is made to monitor cooking recipes in real time, predict cooking completion, and warn operators if the cooking cycle will not be reached in time. Once completed, ThermalTrace will print out a complete report including a graph, readings, customer information and alarms.

The hardware incorporates wireless dataloggers hooked to meat racks with a temperature probe. This device communicates with an industrial encased LoRaWAN receiver. throughout the process.



## Oven to Blast Monitoring

ThermalTrace monitors the entire cooking cycle of a batch from oven to blast. Web based software allows viewing data from any device (phone, laptop, tablet, etc.).



## Quality Control with Prediction

ThermalTrace improves quality control by monitoring the temperature of the product in real time and with predictive monitoring for the entire cooking cycle.



## Automatic Reporting

All reports are generated automatically upon completion showing all the data and alerts of the batch.



## Alarm Monitoring

Receive alarms in real time via email and text messages.



## Rack Hooked Wireless Data loggers

ThermalTrace uses LoRaWAN rack hooked data loggers that follow the entire cooking process for the monitored rack.

# Software



## Exclusive Real-Time Predictive Monitoring for Cooking and Cooling



Operators can examine the cooking and cooling of a batch with a predictive curve that will warn the users if the recipe will complete at the appropriate temperatures at the scheduled time.



## Process and Technical Alarms

batch_1 (Alarms / Notifications)						
①	Name	Actual Temp	Predicted Time	Target		Acknowledge
				Temperature	Time	
2022-08-17 11:36:25	Wrong Alignment Trend			Temperature is not following the expected temperature pattern.		<button>Acknowledge</button>
2022-08-17 11:34:51	High Warning(Logger9A)	82°C		80 °C	75 °C	<button>Acknowledge</button>
2022-08-17 11:34:35	High Alarm(Logger9A)	86°C		85 °C	75 °C	<button>Acknowledge</button>
2022-08-17 11:34:19	High Alarm(Logger9A)	85°C		85 °C	75 °C	<button>Acknowledge</button>
2022-08-17 11:31:43	Wrong Alignment Trend			Temperature is not following the expected temperature pattern.		<button>Acknowledge</button>

Technical (Alarms / Notifications)			
①	Name	Description	Acknowledge
2022-08-17 11:37:19	Stopping Logger Failed (Logger9A)	Logger Stopping Failed.	<button>Acknowledge</button>

Feel confident knowing that you will receive alarms by email and at the bottom of each software web page with detailed information.

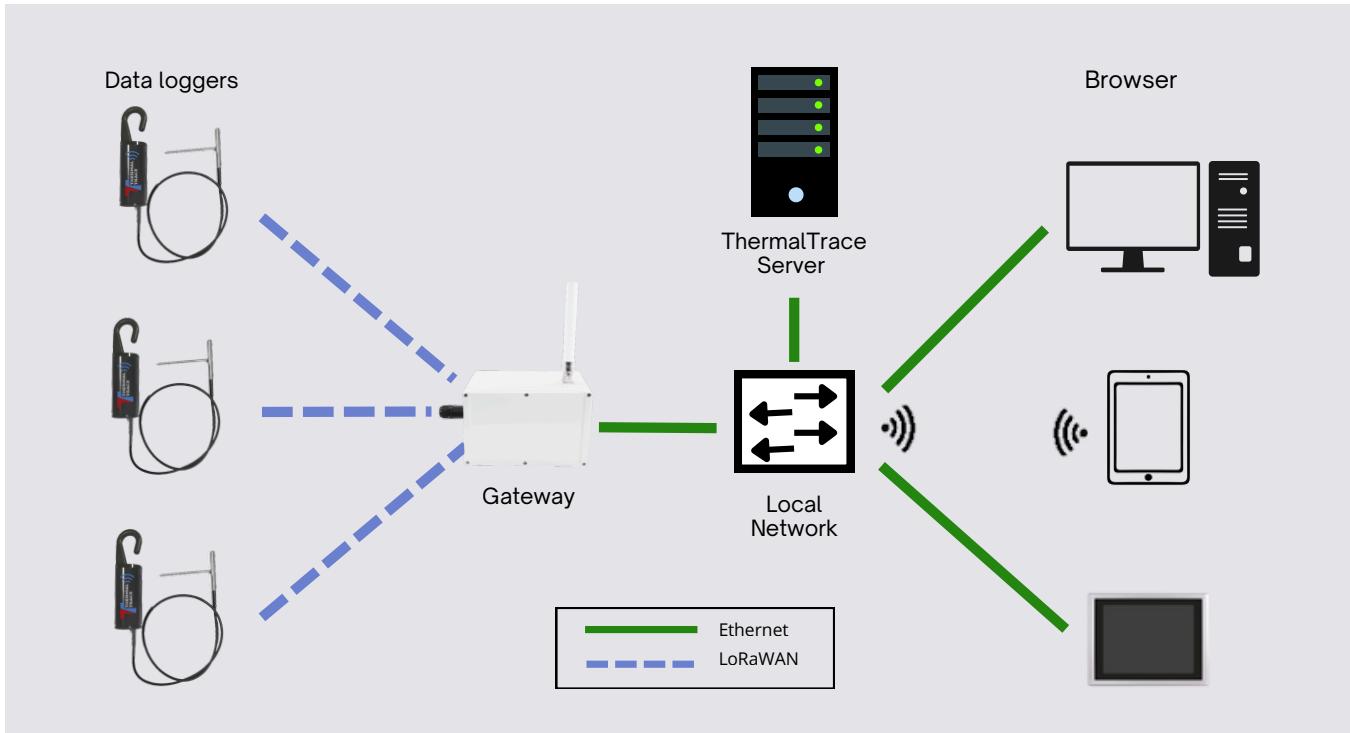


Setup your list of products and configure your cooking and cooling monitoring recipes. Once configured, it is easy to launch a cooking batch.

## Link Products with Predesigned Recipes for Quick Configuration

List of Products					
Create		Actions			
#	Name	Description	Recipe	Actions	
1	Hamburgers	Null	Hamburgers	<button>Edit</button>	<button>Delete</button>
2	Veal	Null	Veal	<button>Edit</button>	<button>Delete</button>
3	Chicken Leg	Null	Chicken Legs	<button>Edit</button>	<button>Delete</button>

# Architecture



## Server

- Core i7 or AMD equivalent.
- 16 GB RAM.
- 500GB + SSD.
- Linux (Ubuntu)

\*All receiver data/alarms are processed by ThermalTrace PC Software.

## Data Logger

- Heat resistant enclosure
- Hooks to food racks
- Piercing RTD probe
- IP67, operating temperature between -20 to 125 C
- Operates inside ovens and blasters.
- Long lasting battery life.
- G sensor to manually start the device

## Receiver

- Data loggers communicate with receiver on 915Mhz frequency using LoRawan protocol.
- Data logger data is sent to receiver.
- Receiver sends data to the ThermalTrace computer database.
- Receiver communicates on local Ethernet to ThermalTrace PC.

# LoRawan

## About

LoRaWAN (Long-Range Wide Area Network) is a type of data communication for large-scale wireless networks. It is designed to enable data acquisition over long distances at low data rates between connected sensors that monitor and retransmit the data.

## LoRaWAN Protocole Architecture

### 1. Sensors (or nodes)

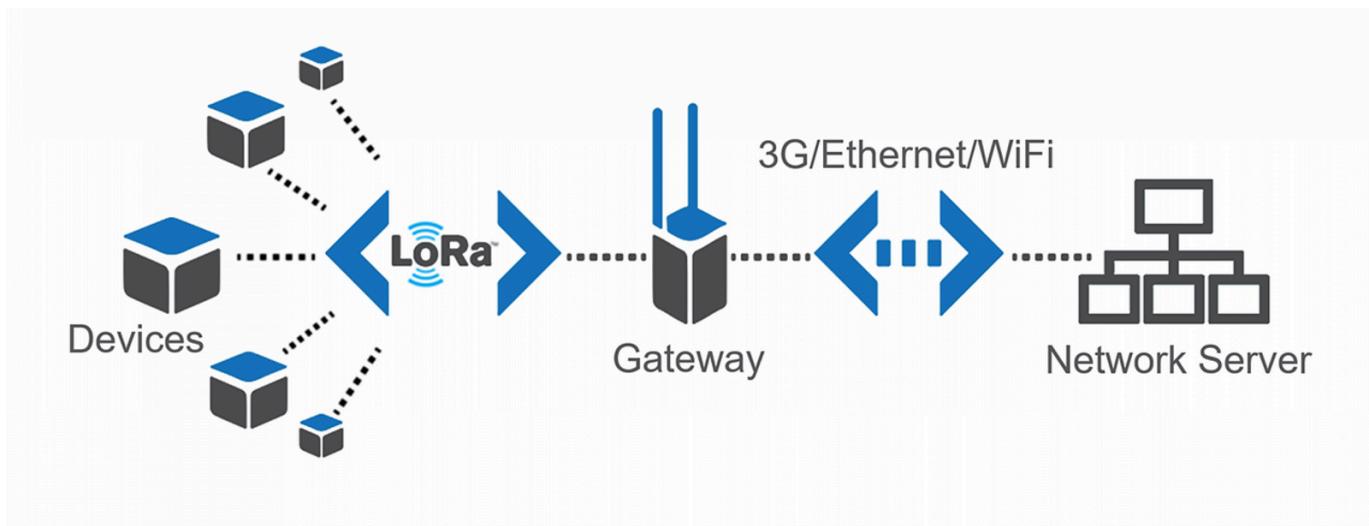
Sensors collect data and transmit it to gateways.

### 2. Gateways

The LoRaWAN gateway is at the heart of the network. LoRaWAN gateways act as concentrators, receiving and transmitting data from LoRaWAN sensors to the ThermalTrace Server.

### 3. The Network Server

The LoRa Network Server (LNS) processes the data and makes it available for IoT applications. IoT (the Internet of Things), refers to the network of physical terminals that can connect to other systems and terminals on the Internet.



## Advantages

The LoRaWAN gateway offers a number of advantages over a more conventional wireless communication solution: Long range: in an open area, the network's range can be several kilometers. In urban areas, it remains quite respectable despite the many surrounding obstacles.

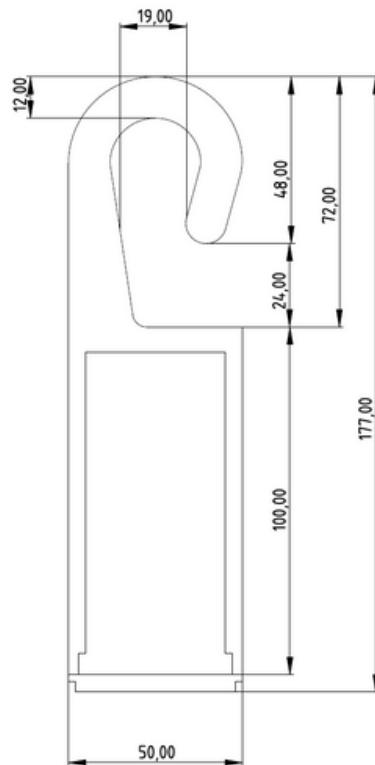
Efficient even inside buildings: the use of broadband signals ensures good penetration inside buildings. The network therefore remains perfectly operational even in cellars or basements

Security: security is a major concern in the IoT. The LoRaWAN protocol incorporates encryption mechanisms (AES128) to ensure data confidentiality and node authentication.

# Technical Data

## Specifications

Temperature	
Probe Temperature Range	-50 to 130 C
Accuracy	0.15 C at 0 C
Sensor Type	100 ohm class A RTD per din en 60751
General	
Reading Rate	1 Reading every 3 min to 1 reading every 24 hours
Memory	25,000 Readings
Start Modes	Start/Stop
Calibration	Digital calibration through software
Calibration Rate	Automatically recorded within device
Power	(1) LiSOCl2 3.6 V battery User Replaceable
Battery Life	1 year @ 5 min reading interval
IP Rating	IP67
Data Format	Date and time stamped °C, °F
Operating System Compatibility	Windows 10 or later   Linux
Operating Range	-20°C -125°C
Cable Lengths	Customizable
Probe Lengths	Customizable
Body Material	P.O.M Polyoxymethylene
Wireless	
915 Mhz Lorawan	
Band	902-928 Mhz
Maximum Output Power	Node: Maximum +20dbm Gateway: Maximum
Receiver Sensitivity	Typically -139dbm
Transmission Distance	15KM line of sight



## ThermalTrace VS ThermalTrace-Light

	ThermalTrace	ThermalTrace Light
Software	Full version	Light version
Recipe prediction	Included	No
Computer (server)	Intel i7, Ryzen 7, 16 GB Ram, Sata SSD 500 GB, Linux	Intel i5, 10th generation, 16 GB Ram, 1 TB NVME SSD, Linux
Wireless receiver	Quantity as needed	1
Logger	Unlimited	10 maximum
Number of users	Unlimited	3
Alarms	e-mail and text	e-mail only
Remote site survey	4 hours	No
System Configuration at Exceltec	4 hours	4 hours
Software configuration	4 hours	Done by customer
Remote system set-up assistance	5 hours	2 hours
Post start-up remote support	10 hours	4 hours
Training	2 hours	2 hours

