



Distribution Stocking Package CTS Temperature Sensing

Q1 2026
January 21, 2026

www.ctscorp.com





Temperature Solutions

- ❖ We are manufacturer of world class temperature sensing solutions
- ❖ Over 60 years of proven expertise custom engineering the most reliable, high-quality sensors for mission critical applications
- ❖ Global footprint with temperature sensor manufacturing locations in North America, Europe, & Asia
- ❖ Specialize in temperature sensors for the HVAC/R, Water Heating, Pool & Spa, Medical/Instrumentation, Industrial, Food Service and Aerospace/Defense markets

CTS Temperature Sensing Solutions

2019



2020

Sensor Scientific, Inc.



2022



TEWA

TEMPERATURE SENSORS

Industrial and Medical Applications



HVAC & Refrigeration



Boilers & Water Heating



Pool & Spa



Food Service

Medical Applications



Neonatal applications



Lab freezers



Fluid warmers



Analytical Instruments

Industrial, Medical and Automotive Applications



HVACR



WATER HEATING



AUTOMOTIVE



FOOD INDUSTRY

Global Footprint Temperature Sensing



-  TEMP Sensing Locations
-  Sales/Technical Office
-  Manufacturing Facility



Temperature Solutions



TEWA

Total headcount: 600+
Total turnover 2024: ~\$50M

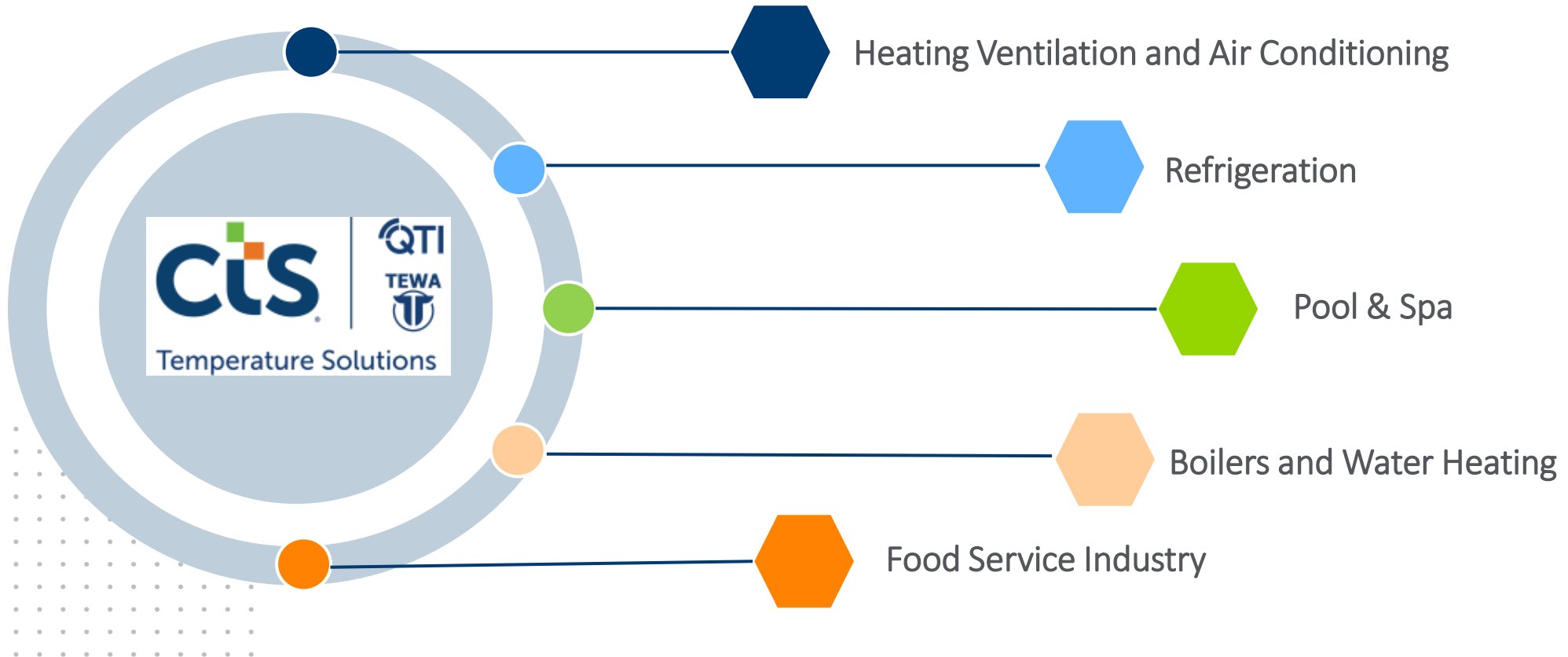


Sensor Scientific, Inc.



TEWA
TEMPERATURE SENSORS

Key Industrial Temperature Sensor Applications



Heating Ventilation and Air Conditioning

Temperature sensors are found in **thermostats** to detect the current room temperature in order to know which signals to send.

Units like air-conditioners and heaters work with thermistors to sense the temperature of the air being created to bring the room up to the thermostat specific temperature.



- Air conditioners
- Air handling units (commercial / domestic)
- Furnaces / air heating systems
- Heat pumps (!)
- Thermostats
- Outside temperature measurement
- Ventilation duct temperature measurement

Refrigeration

Temperature sensors are used to control temperature during preparation, storage or transportation of mostly food related products.



- Household or commercial refrigerators
- Refrigerated cabinets for supermarkets
- General purpose control units
- Ice cube and ice cream makers
- Vending machines (beer)
- Refrigerated transport
- Laboratory equipment



Pools and Spas

NTC thermistor sensors are used in pool and spa heating systems for a combination of compensation and control as the temperature sensors are in place in order to change the temperature of the water based on environmental factors.



- Pool automation systems
- Heat pumps
- Solar heaters
- Gas heaters
- Whirlpools / jacuzzies

Boilers and water heating

NTC and RTD temperature sensors are vital in the Boiler and Water Heating equipment for water temperature management and control.



- Conventional tank water heater
- Tankless/on-demand water heaters
- Condensing water heater
- Electric or gas -powered heaters
- Pellet heaters
- Solar-powered water heater
- Heat pumps
- Electric showers

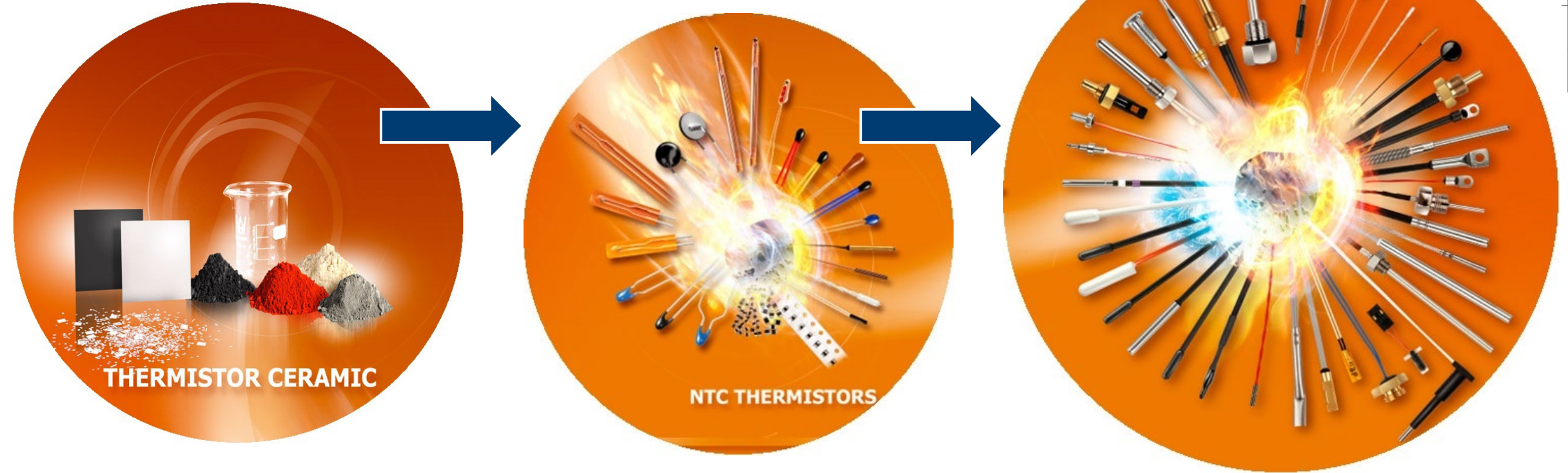
Food Service Industry

Thermocouples, RTDs and thermistors are the most common temperature sensors in the foodservice industry. Each technology has certain advantages when used for cooking, grilling or cooling and freezing.



- Coffee machines (espresso/brewer types)
- Vending machines
- Cold/hot drinks dispensers
- Fryers
- Baking ovens
- Stoves
- Ice cube and ice cream machines
- Refrigerators
- Blast food chillers
- Dishwashes

CTS Temperature Sensing Technology



- ❖ IN-HOUSE DEVELOPED AND CONTROLLED PROCESS OF MANUFACTURING NTC THERMISTOR CERAMICS

- ❖ EPOXY OR GLASS COATED NTC THERMISTORS

- ❖ FULLY CUSTOMISED PROBE ASSEMBLIES FOR WIDE RANGE OF TEMPERATURES, ENVIRONMENTS, SENSING ELEMENTS AND APPLICATIONS

CTS NTC Thermistors



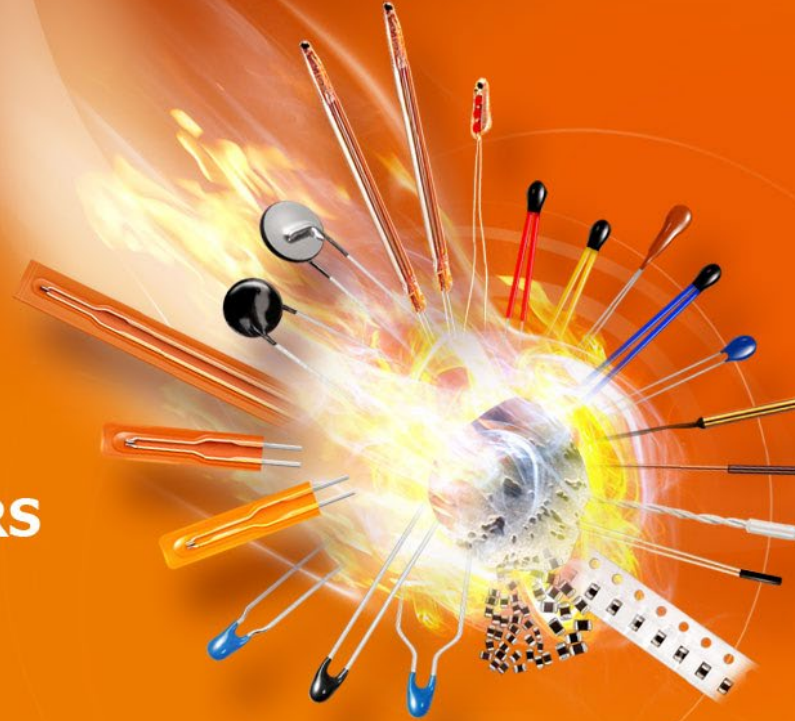
- ❖ HIGH PRECISION INTERCHANGEABLE THERMISTORS WITH CURVE MATCHED TOLERANCE DOWN TO $\pm 0.1^{\circ}\text{C}$ BETWEEN 0°C AND 70°C
- ❖ HIGH TEMPERATURE GLASS ENCAPSULATED THERMISTORS WITH 300°C RATING
- ❖ FAST RESPONSE MINIATURE THERMISTORS WITH 0.5mm DIAMETER AND T63 LESS THAN 200ms
- ❖ KAPTON FOIL INSULATED THERMISTORS WITH 0.5mm THICKNESS
- ❖ LEAD FRAME EPOXY COATED THERMISTORS WITH POINT MATCHED RESISTANCE TOLERANCE DOWN TO $\pm 0.5\%$
- ❖ CUSTOMIZED SOLUTIONS – BEAD SIZE, RT CHARACTERISTICS, WIRE CONFIGURATION, GLASS PROBES, CUSTOM SHAPES

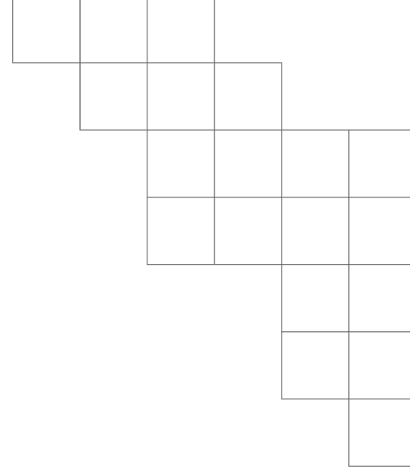
CTS Temperature Sensors



- ❖ WIDE RANGE OF STANDARD AND CUSTOMIZED TEMPERATURE SENSORS DESIGNED ACCORDING TO INDIVIDUAL CUSTOMER'S REQUIREMENTS COVERING APPLICATIONS IN TEMPERATURE RANGE BETWEEN **-150°C AND +800°C**
- ❖ CUSTOMER SPECIFIC MOUNTING ARRANGEMENTS AND HOUSINGS – STAINLESS STEEL, BRASS, OVERMOLDED PLASTICS, RESINS
- ❖ WIDE RANGE OF SENSING ELEMENTS: NTC, PTC, PT100/1000, KTY81/84, DS18B20, LM335, MANY OTHERS
- ❖ VARIETY OF CABLE CONFIGURATIONS AND CONNECTOR TYPES

NTC THERMISTORS

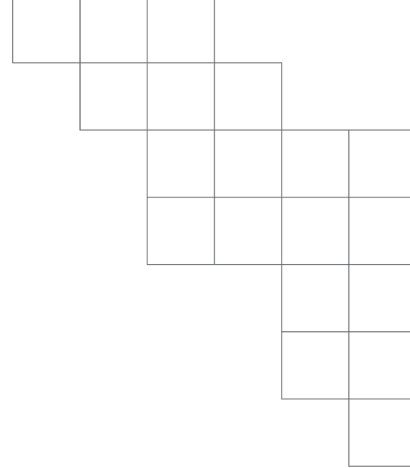




Glossary of Terms

- ❖ **Thermistor:** A thermally sensitive resistor

Most NTC thermistors are made from various compositions of manganese (ceramic) and metal oxides: nickel, cobalt, copper, and/or iron. Thermistors have been in production since the early 1940s. Better raw materials and advances in ceramic processing technology have contributed to overall reliability, interchangeability and cost-effectiveness of thermistors
- ❖ **NTC:** Negative Temperature Coefficient –
Temperature increase leads to resistance decrease
- ❖ **PTC:** Positive Temperature Coefficient –
Temperature increase leads to resistance increase
- ❖ **Reference Temperature:** Identified temperature where resistance is specified
(usually 25°C, but can also be 0°C or 100°C)
- ❖ **Beta Constant:** Indication of the shape of the curve representing relationship
between resistance and temperature of NTC thermistor. Calculated
between 2 temperature points, for example, (25/85), (0/50), (25/100), etc.
- ❖ **R/T Curve:** Specific chart that defines resistance over a temperature range



Glossary of Terms

❖ Resistance Tolerance can be expressed:

- in percent or degrees
- in one temperature point (so called **point matched** thermistors)
- in certain temperature range (so called **curve matched** thermistors)

for example, $\pm 1\%$ at 25°C or $\pm 2\%$ at 100°C
 $\pm 0.05^{\circ}\text{C}$ from 25°C to 45°C or $\pm 0.2^{\circ}\text{C}$ from 0°C to 70°C)

❖ Time Constant/Response Time: Time required for resistance to change to typically 63% (t_{63}) of newly impressed temperature.

❖ Dissipation Constant: Power required to self-heat a thermistor by 1°C

❖ Maximum Operating Temp: Maximum temperature at which a Thermistor will operate for an extended period of time with acceptable stability

NTC Thermistor Product Introduction

Glass Encapsulated NTC Thermistor

TT-2 SERIES

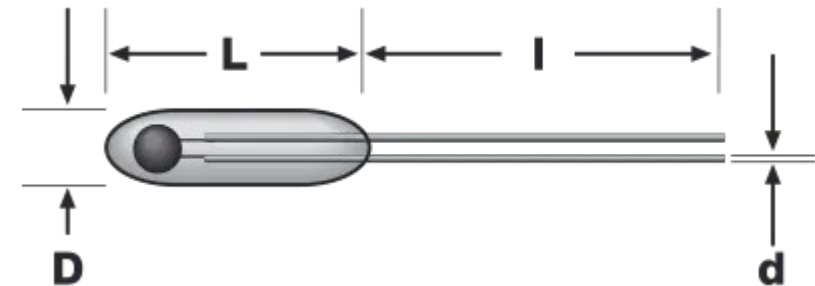
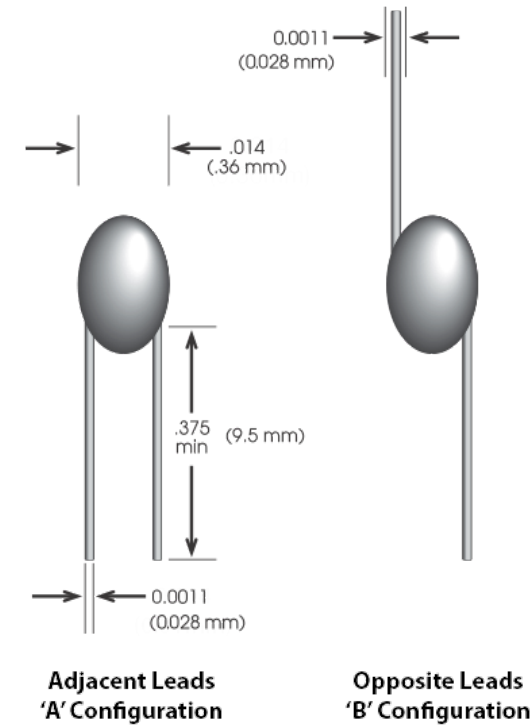
FACTS AND FEATURES

- ❖ [Link to TT-2](#)
- ❖ Glass encapsulation provides extra moisture protection and stability at high temperatures, up to 300°C typically
- ❖ Available with dummet wire with or without polyimide tubes insulation or with welded teflon extension wires
- ❖ Available in custom probe assemblies
- ❖ Long glass body, up to 50mm
- ❖ Typical resistance tolerance between $\pm 1\%$ and $\pm 10\%$ point matched



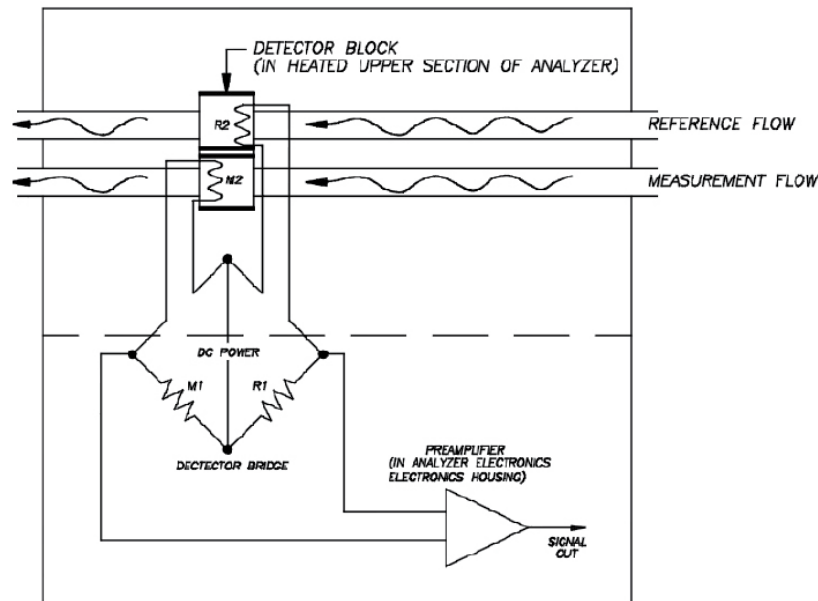
Blackbeads – Background

- What are Blackbeads?
 - Original “thermistor” developed back in the 50’s
 - Ceramic slurry deposited on platinum wires, coated with glass & fired
- What are Bead-in-Glass probes?
 - Blackbead thermistor welded to dumet wires
 - Coated in glass
- Why are Blackbeads & Bead-in-Glass probes beneficial?
 - Much more stable (less drift) than typical epoxy coated thermistors
 - Hermetically sealed
 - Can be self-heated without risk of thermal runaway



Blackbeads Applications – Gas Chromatography

- Gas Chromatography
 - Thermistors welded to header
 - Thermistors supplied in matched pairs
 - Thermistors self-heated (one reference in a pure gas flow and one in carrier gas-flow)
 - As gas passes across the thermistor, the temperature of the thermistor drops at a rate corresponding to the carrier gas's thermal conductivity



Typical Gas Chromatograph circuit



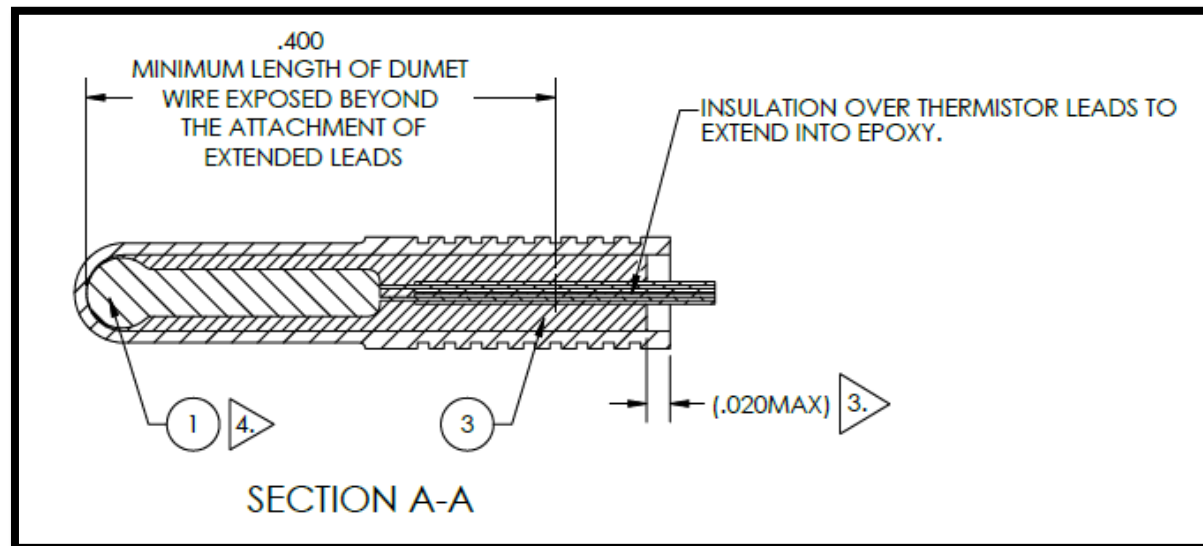
Sample of Blackbead welded to header



Sample of Blackbead welded to header

Blackbeads Applications – Ultra-Stable Probes

- Ultra-Stable Probes
 - Bead-in-Glass probe soldered to extension leads
 - Thermistors thermally cycled and aged for up to 6 months to eliminate drift
 - Ultra-stable probes required for the following applications
 - Water buoys in the ocean
 - Calibration standards
 - Some medical sensors (PCR etc) where the environment is aggressive and stability is vital



Cross-section of a Bead-in-Glass probe in water quality instrument;
Required stability of <0.05% drift over 2 years

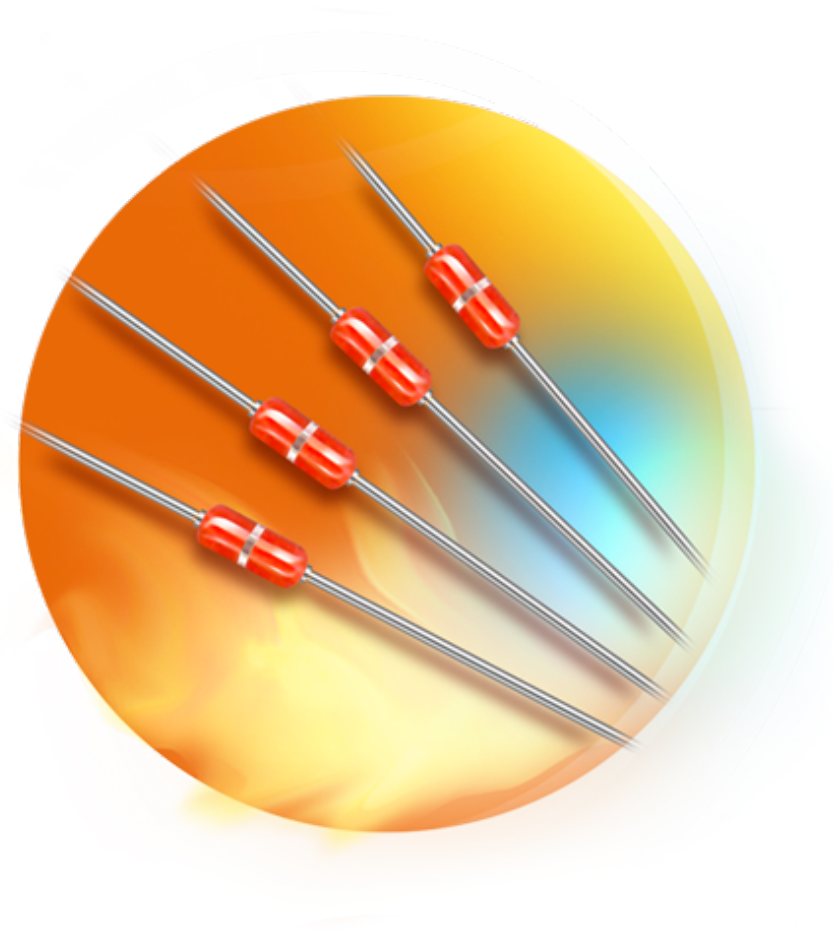
NTC Thermistor Product Introduction

Diode Type Glass NTC Thermistor

TT-DO SERIES

FACTS AND FEATURES:

- ❖ [Link to TT-DO](#)
- ❖ Maximum temperature – 250°C/300°C
- ❖ Available with $\pm 1\%$ point matched tolerance at custom temperature points or as **curve matched $\pm 0.2^\circ\text{C}$ from 0°C to 70°C for standard RT**
- ❖ Customized RT characteristics are available
- ❖ Excellent price/quality ratio
- ❖ Dumet leads coated with tin or nickel are suitable for soldering or welding
- ❖ Tape and Reel packaging available



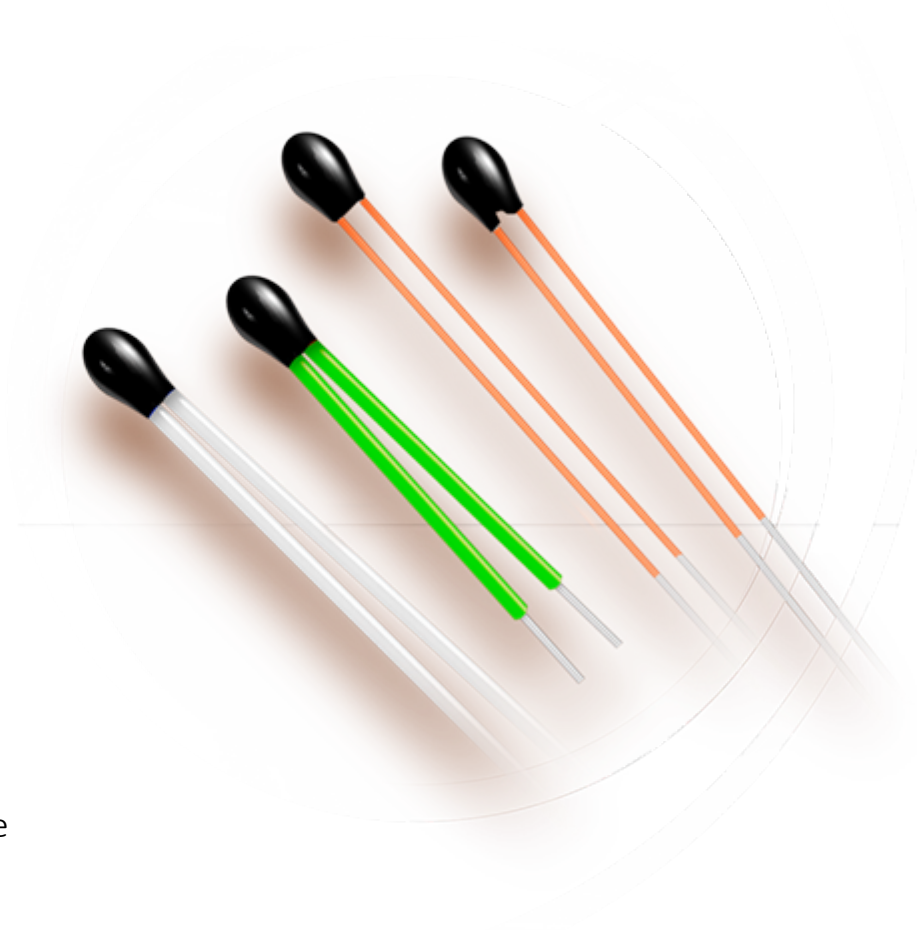
NTC Thermistor Product Introduction

Epoxy Coated NTC Chip Thermistor

TT-S SERIES

FACTS AND FEATURES:

- ❖ [Link to TT-3](#)
- ❖ Curve matched characteristics, down to $\pm 0.05^{\circ}\text{C}$ tolerance between 0°C and 70°C or point matched down to $\pm 0.5\%$
- ❖ Custom bead size and wire configuration
- ❖ Tight resistance and Beta Value tolerance
- ❖ Excellent stability and reliability
- ❖ Wide range of RT curves and resistance values available
- ❖ Operating temperature range between -40°C to 150°C



NTC Thermistor Product Introduction

NTC Microchip Thermistor

TT-5 SERIES

FACTS AND FEATURES:

- ❖ [Link to TT-5](#)
- ❖ Small size down to **0.5mm** diameter
- ❖ Fast Response Time down to **200ms** in well stirred liquid
- ❖ Fully compliant with **YSI400 Medical Probes**
- ❖ Point or Curve matched characteristics
- ❖ Custom size tube and wire configuration
- ❖ Tight resistance and Beta Value tolerance



NTC Thermistor Product Introduction

Thin-Film NTC Thermistor

TT-6 SERIES

FACTS AND FEATURES:

- ❖ [Link to TT-6](#)
- ❖ Small thickness down to 0.55mm
- ❖ Available with custom kapton film shapes
- ❖ Excellent price/quality ratio
- ❖ Point Matched Characteristics down to $\pm 0.5\%$ at 25°C
- ❖ Typical range of Resistance and Beta Values
- ❖ Operating temperature range from -40°C to 125°C
- ❖ Frequently used for heat cost allocators or fire detectors



NTC Thermistor Product Introduction

Lead Frame NTC Thermistor

TT-7 SERIES

FACTS AND FEATURES:

- ❖ [Link to TT-7](#)
- ❖ Industry Standard Resistance and Beta Values
- ❖ Cost effective
- ❖ Point Matched Characteristics down to $\pm 0.5\%$ at 25°C
- ❖ Very good endurance against thermal shock and moisture due to **powder coating**
- ❖ Operating temperature range from -40°C to 125°C
- ❖ Tape and Reel/BOX Packaging Available



NTC Thermistor Product Introduction

SMD NTC Thermistor

TT-8 SERIES

FACTS AND FEATURES:

- ❖ [Link to TT-8](#)
- ❖ High accuracy down to $\pm 0.5\%$ at 25°C for specific types and RT curves
- ❖ Available in 0402, 0603, 0805 sizes
- ❖ Industry standard range of beta constant and resistance values
- ❖ Available in tape and reel configuration
- ❖ Cost Effective



NTC Thermistor Product Introduction

PTC thermistor sensors

TT-PTC SERIES

FACTS AND FEATURES:

- ❖ [Link to TT-PTC](#)
- ❖ Custom size and wire configurations
- ❖ Standard resistance values, according to DIN44081 and DIN44082
- ❖ Available with Kynar insulating tubes or epoxy coated beads only
- ❖ Single, double, triple or more PTC sensors available in one harness



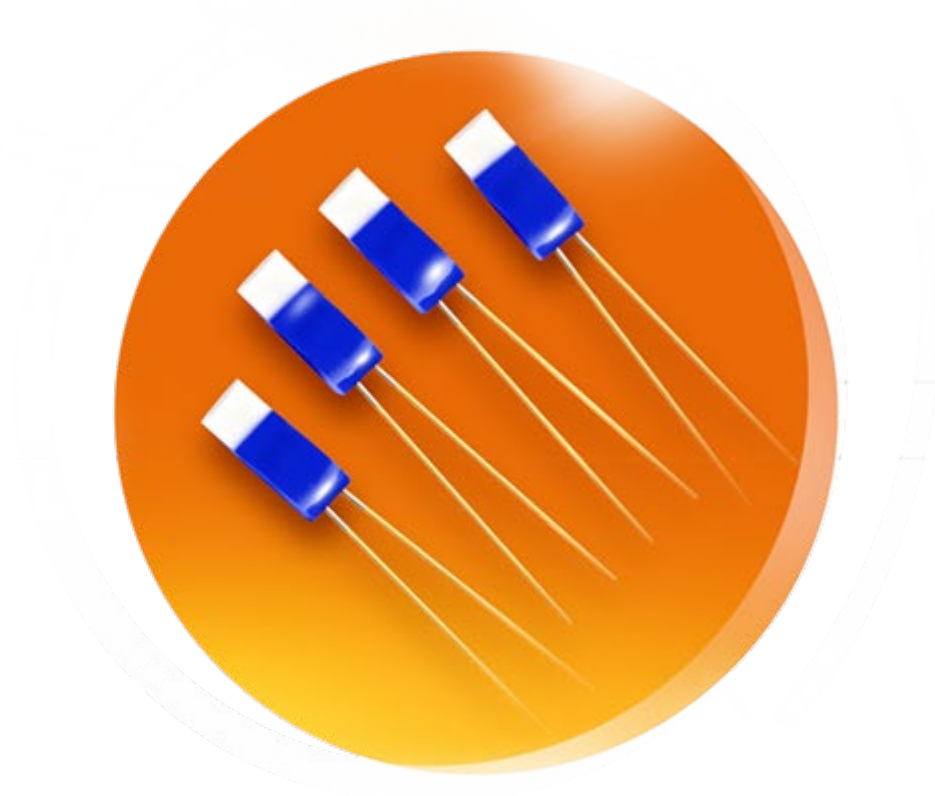
NTC Thermistor Product Introduction

Platinum Temperature Sensors

TT-PT SERIES

FACTS AND FEATURES:

- ❖ [Link to TT-PT](#)
- ❖ Operating Temperature Range between -40°C and 500°C
- ❖ Available in PT100, PT500, PT1000 industry standard characteristics
- ❖ Typical sizes 2x5mm, 1.6x3.6mm, others under development
- ❖ Tolerance Classes A, B, 1/3DIN (AA)
- ❖ Very good long-term stability and reliability also at high temperatures
- ❖ Very good resistance against shock and vibrations



Thermistor Manufacturing Capabilities

- ❖ THERMISTOR MANUFACTURING CAPABILITIES
- ❖ IN-HOUSE DEVELOPED AND CONTROLLED
PROCESS OF MANUFACTURING NTC THERMISTOR CERAMICS
- ❖ WIDE RANGE OF CUSTOMISED R/T CURVES
- ❖ ABILITY TO DESIGN R/T CURVES MEETING CUSTOMER'S REQUIREMENTS
- ❖ FLEXIBILITY IN ADJUSTING RESISTANCE VALUES
DEPENDING ON APPLICATION REQUIREMENT
- ❖ HIGH STABILITY AND RELIABILITY OF CERAMICS



Temperature Sensors

Temperature Sensor Introduction

Custom Temperature Sensors

TT-4 SERIES

FACTS AND FEATURES:

- ❖ [Link to TT-4](#)
- ❖ Provide best possible protection against the environment conditions
- ❖ Proven stability and reliability for new designs by internal laboratory testing
- ❖ Variety of metal and plastic housings for different mounting arrangements
- ❖ Potted with different kinds of resin for good sensor protection
- ❖ Wide range of Sensing Elements:
NTC, PT100/1000, KTY81/84, DS18B20, LM335, many others



Temperature Sensor Introduction

Custom Temperature Sensors

TT-4 SERIES

FACTS AND FEATURES:

- ❖ [Link to TT-4](#)
- ❖ Available with special kinds of cables, connectors, assembled in harnesses
- ❖ Customized solutions for small quantities
- ❖ Quick sample delivery
- ❖ Cost effective solutions for small, medium and big projects



Temperature Sensor Introduction

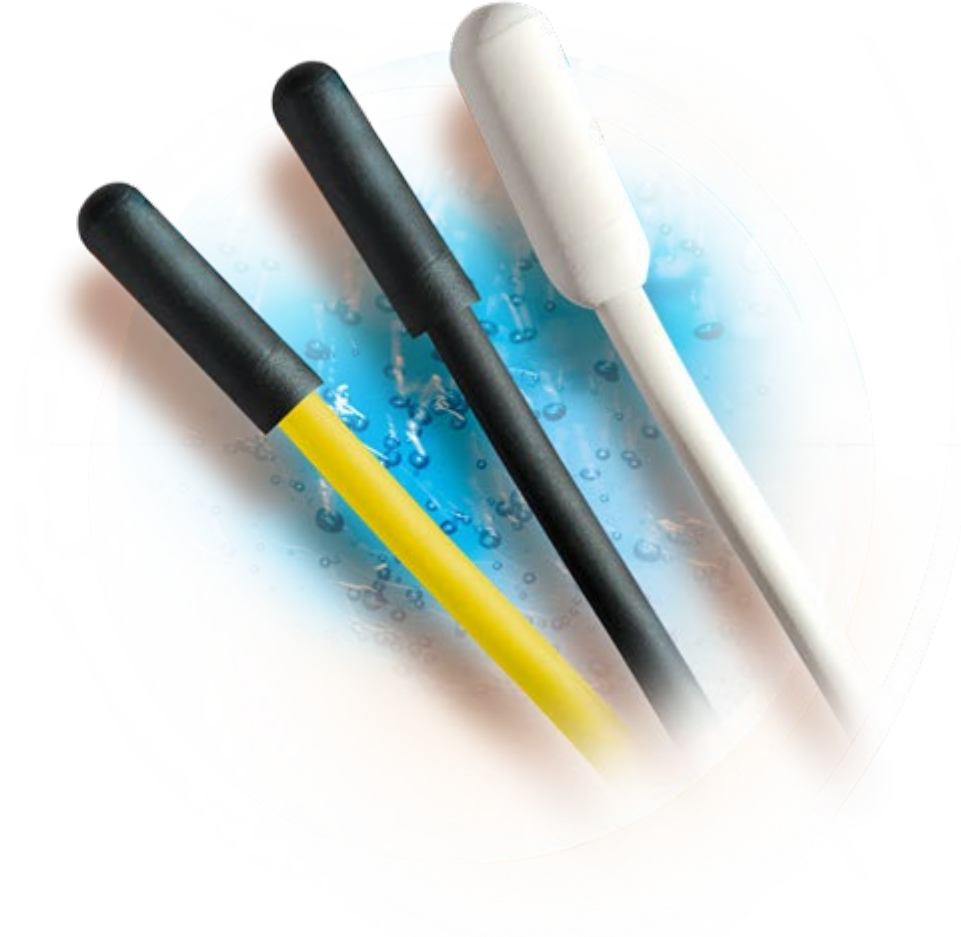
Waterproof Temperature Sensor

TT-O SERIES

[Link to TT-0](#)

TT-O series sensors are **IP68** waterproof temperature probes encapsulated with thermoplastic elastomer materials in overmoulding technology.

The TT-O **overmoulded** probes are a perfect solution for applications where the best waterproof and moisture protection is required.

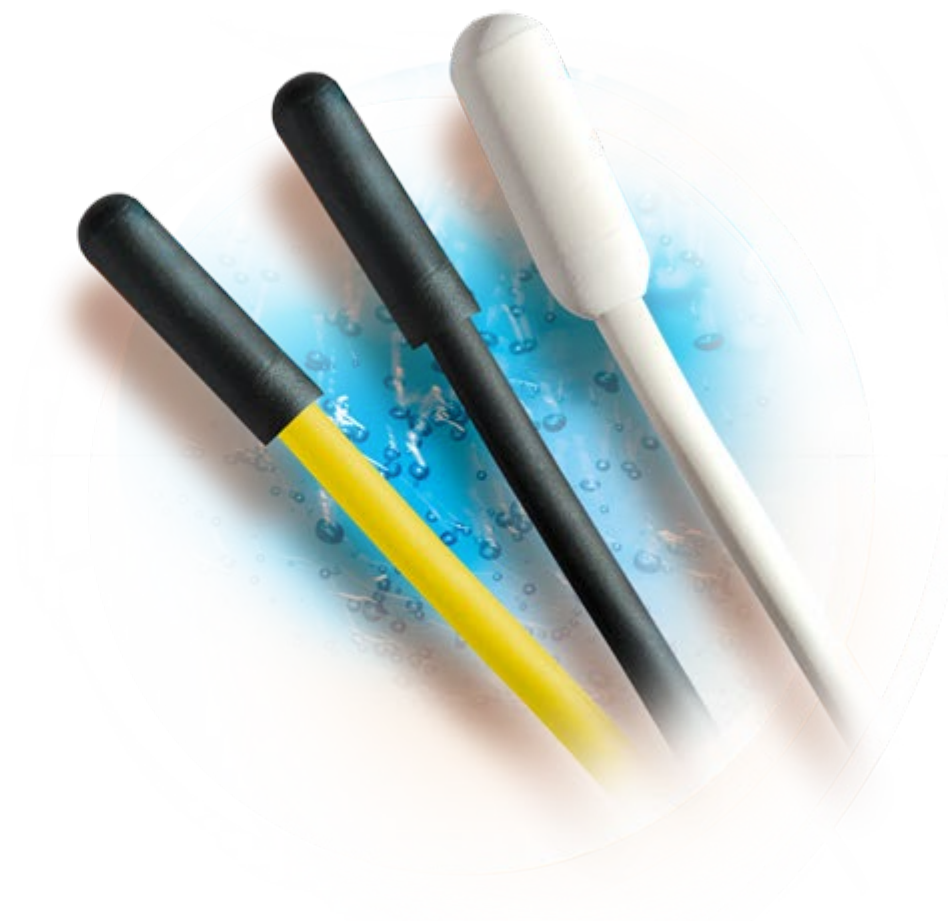


Temperature Sensor Introduction



FACTS AND FEATURES:

- ❖ [Link to TT-0](#)
- ❖ Excellent insulation against moisture
- ❖ Degree of waterproof protection **IP68**
- ❖ NTC and PTC thermistors, PT100/PT1000 versions are available
- ❖ Overmolded tip diameters from 3.5mm, 4.0mm, 4.5mm, 5x20mm, 6.5x25mm, custom sizes are available
- ❖ Very flexible, standard or rigid cable version available depending on mounting arrangement
- ❖ Available with steel cap for better mechanical protection



Temperature Sensor Introduction

Waterproof Temperature Sensor TT-0 SERIES

TYPICAL APPLICATIONS:

- ❖ [Link to TT-0](#)
- ❖ Refrigeration (evaporator)
- ❖ Vending machines, Chilled cabinets
- ❖ Air Conditioning
- ❖ Underfloor heating
- ❖ Climate control systems
- ❖ Industrial Process control
- ❖ Refrigerated transport



DESIGN

Temperature Sensor Design Experts

At CTS, we've spent over 60 years building a reputation that goes well beyond the products we make. That's why for us, solving any problem is no problem.

The Design Process

- Drop-In Replacements or Custom Engineered Solutions
- Partnership with OEM to understand applications, environments, sensor functions and requirements
- Existing sensor design analysis & evaluation
- Designs that eliminate common sensor failure modes
- Sourcing of top-quality cost-effective materials through audited & approved vendor network



VALIDATION

Because Failure is not an Option

We understand that the highest quality products require mission-critical parts that refuse to fail. We also recognize that many of our competitors sacrifice the quality of their temperature sensors for cheap solutions that COST YOU significantly in the long run.

Validation = Warranty Mitigation

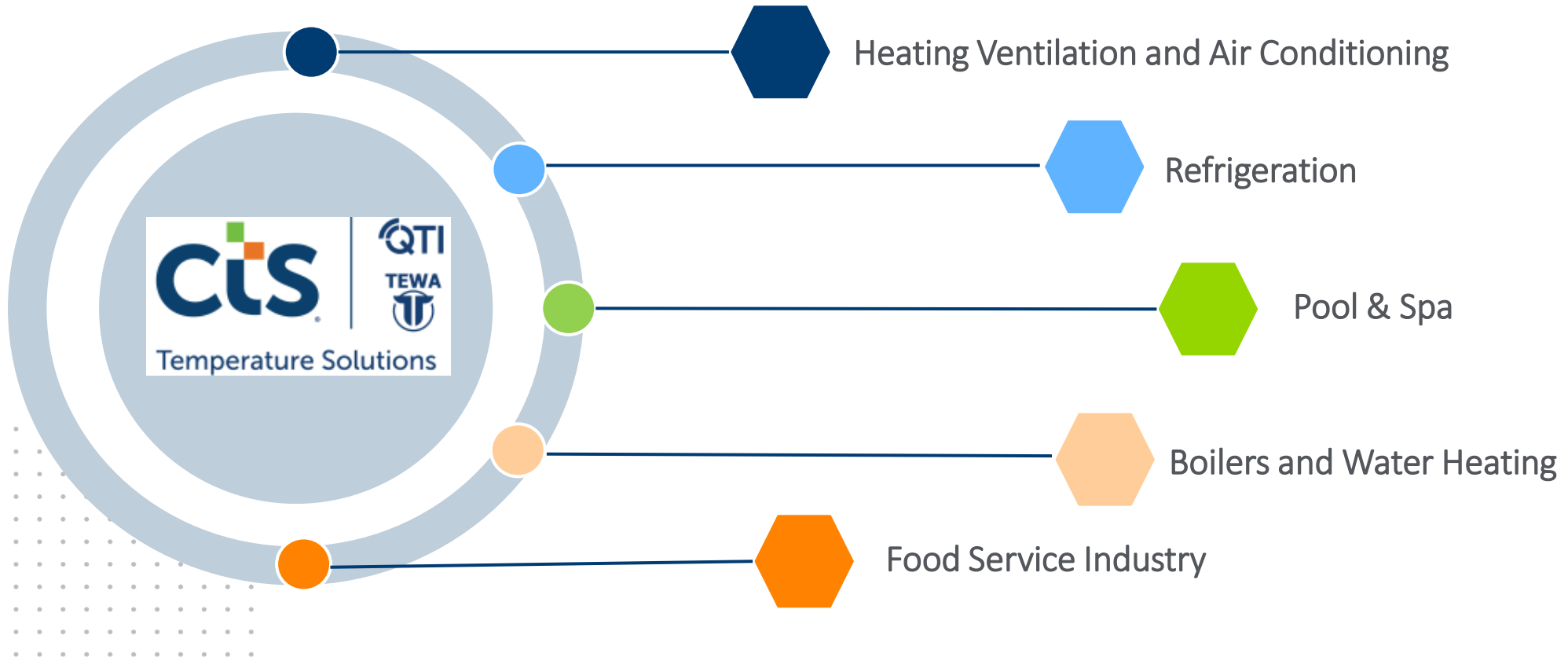
- In-House Validation Capabilities
 - HALT (Dunk Testing)
 - Salt Fog
 - Dye Penetrant
 - X-Ray
 - Pull-test
 - Thermal Shock
 - Time-response
 - Salt-water immersion
 - Extreme temperature exposure (-200C to +300C)



A Cheatsheet

- ❖ Drawing with electrical parameters
- ❖ Competitor's part number
- ❖ Application and specific environmental conditions
- ❖ Discrete element or complete sensor assembly
- ❖ NTC/PT1000/TC/other sensing element, RT characteristics and tolerances
- ❖ Sample or photographs of existing products

Key Industrial Temperature Sensor Applications



Key Industria temperature Sensor Applications



HVAC



Pool & Spa



Refrigeration



Instrumentation



Food Service

Boilers & Water Heating



Heating Ventilation and Air Conditioning

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- Air conditioners
- Air handling units (commercial / domestic)
- Furnaces / air heating systems
- Heat pumps (!)
- Thermostats
- Outside temperature measurement
- Ventilation duct temperature measurement

Heating Ventilation and Air Conditioning

Custom Temperature Sensors

TT-4 SERIES

- ❖ [Link to TT-4](#)
- ❖ Best possible protection against the environment conditions
- ❖ Variety of metal and plastic housings for different mounting arrangements
- ❖ Wide range of Sensing Elements: NTC, PT100/1000, KTY81/84, DS18B20, LM335, many others



SMD NTC Thermistor

TT-8 SERIES

- ❖ [Link to TT-8](#)
- ❖ High accuracy down to $\pm 0.5\%$ at 25°C for specific types and RT curves
- ❖ Available in 0402, 0603, 0805 sizes
- ❖ Industry standard range of beta constant and resistance values



Waterproof Temperature Sensor

TT-O SERIES

- ❖ [Link to TT-0](#)
- ❖ Excellent insulation against moisture
- ❖ Degree of waterproof protection IP68
- ❖ NTC and PTC thermistors, PT100/PT1000 versions are available
- ❖ Various cable colors and tip sizes available



Lead Frame NTC Thermistor

TT-7 SERIES

- ❖ [Link to TT-7](#)
- ❖ [Link to TT-7C epoxy coated leads](#)
- ❖ Industry Standard Resistance and Beta Values
- ❖ Point Matched Characteristics down to $\pm 0.5\%$ at 25°C
- ❖ Very good endurance against thermal shock and **moisture** due to powder coating
- ❖ Tape and Reel/BOX Packaging Available



Refrigeration

Temperature sensors are used to control temperature during preparation, storage or transportation of mostly food related products.



- Household or commercial refrigerators
- Refrigerated cabinets for supermarkets
- General purpose control units
- Ice cube and ice cream makers
- Vending machines (beer)
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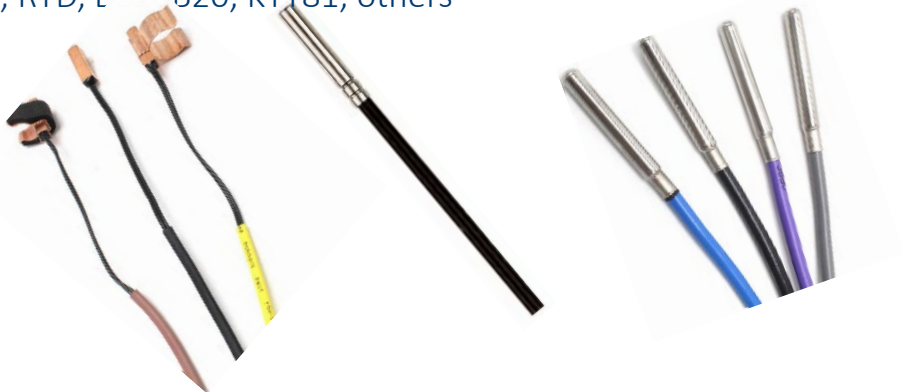


Refrigeration

Custom Temperature Sensors

TT-4 SERIES

- ❖ [Link to TT-4](#)
- ❖ Single, double or triple rolled housings
- ❖ Wide range of sizes and mounting arrangements
- ❖ Variety of cables available – PVC, TPE, silicone, Teflon, peek, others
- ❖ Customized packaging, marking and labelling
- ❖ Various clip sizes available
- ❖ Available with following sensing elements: NTC thermistor, RTD, DS18B20, KTY81, others



Waterproof Temperature Sensor

TT-O SERIES

- ❖ [Link to TT-O](#)
- ❖ Various tip sizes
- ❖ Tested to over 30,000 freeze-thaw cycles
- ❖ Waterproof rating to **IP68**
- ❖ Optional clip mount for easy installation
- ❖ Version with **integrated rubber strap** available
- ❖ Single or double insulated halogen free cable
- ❖ Available with following sensing elements: NTC thermistor, RTD, DS18B20, KTY81, others



Pools and Spas

NTC thermistor sensors are used in pool and spa heating systems for a combination of compensation and control as the temperature sensors are in place in order to change the temperature of the water based on environmental factors.



- Pool automation systems
- Heat pumps
- Solar heaters
- Gas heaters
- Whirlpools / jacuzzies

Pools and Spas

Custom Temperature Sensors

TT-4 SERIES



- ❖ [Link to TT-4](#)
- ❖ Industry standard plastic housing for convenient assembly process
- ❖ Industry standard RT characteristics
- ❖ UL recognized thermistors, molding materials and cables
- ❖ Customized packaging, marking and labeling
- ❖ Wide temperature range for measuring ambient air, water, or flue gas temperatures
- ❖ UV stabilized cables to prevent degradation in sunlight



Boilers and water heating

NTC and RTD temperature sensors are vital in the Boiler and Water Heating equipment for water temperature management and control.



- Conventional tank water heater
- Tankless/on-demand water heaters
- Condensing water heater
- Electric or gas -powered heaters
- Pellet heaters
- Solar-powered water heater
- Heat pumps
- Electric showers

Boilers and water heating

Custom Temperature Sensors

TT-4 SERIES

- ❖ [Link to TT-4](#)
- ❖ Single, double or triple rolled housings
- ❖ Wide range of sizes and mounting arrangements
- ❖ Variety of cables available – PVC, TPE, silicone, Teflon
- ❖ Various clip-on-pipe solutions available
- ❖ Brass, stainless steel or plastic housings
- ❖ Customized shaped and thread types and sizes
- ❖ Fast response sensors for showers and tankless heaters
- ❖ Cable sensors or with integrated connectors
- ❖ Available with following sensing elements: NTC thermistor, RTD, DS18B20, KTY81, others



Food Service Industry

Thermocouples, RTDs and thermistors are the most common temperature sensors in the foodservice industry. Each technology has certain advantages when used for cooking, grilling or cooling and freezing.



- Coffee machines (espresso/brewer types)
- Vending machines
- Cold/hot drinks dispensers
- Fryers
- Baking ovens
- Stoves
- Ice cube and ice cream machines
- Refrigerators
- Blast food chillers
- Dishwashes

Food Service Industry

Custom Temperature Sensors

TT-4 SERIES

Thermocouple

TT-TCO SERIES

❖ [Link to TT-4](#)

- ❖ Stainless steel housings for maximum durability
- ❖ J,K,N Thermocouple sensors
- ❖ Mineral Insulated probes for high temperatures
- ❖ Freeze thaw resistant sensors for refrigeration
- ❖ Dedicated sensors for blast chiller applications
- ❖ Meat probes for controlling cooking processes

Contact Us





Contact Our Temp Sensor Team

Whether you seek standard products or custom designs, CTS can partner with you on your temperature sensor solution.

[Contact Temp Sensing Team](#)