



TEMPSENS
Thermal & Cable Solutions

Temperature Measurement
for

PHARMACEUTICAL INDUSTRIES

www.tempsens.com

About The Company

Tempsens is a part of PYROTECH Group, which was established in 1976 by four tech-savvy technocrats. TEMPESENS has carved its niche in bringing technology and engineering together in the field of Thermal and cable solutions.

After the initial beginning with Thermocouples and RTDs, Tempsens has increased its product basket to Wires, Cables, Non-Contact Pyrometers, Thermal imagers, Heaters, Furnaces and Calibration equipment etc. Tempsens has been adding innovative products in its domain area.

Our mission is to lead the Thermal and Cable industry with Passion, Innovation, Intelligence & Reliability.

With covered area of 2,70,000 sq. ft. in head office India and plants in Germany and Indonesia, we today are the largest and most innovative company in our domain.

Tempsens is an ISO 9001:2015, ISO 14001:2015, ISO 45001: 2018, ATEX, IECEX certified company with five NABLAccredited Laboratories.

Tempsens has earned the customer reputation worldwide of being a Preferred Vendor for its custom built and innovative solutions; quick delivery, high technical standards and outstanding quality.



Tempsens Instruments U# I



Tempsens Instruments U# II



Tempsens Instruments U# II Cable Plant



Tempsens Instruments U# IV Cable Plant



Marathon & AST Plant



Tempsens GmbH - Germany



Pt. Tempsens Asia Jaya - Indonesia

Facilities



WELDING AND BRAZING

- Laser Welding Machines
- Robotic Welding Machines
- Micro Plasma Welding Machines
- TIG Welding Machines with Pulse Hot TIG Modulation And Rotary Positioner
- Induction Brazing Machines
- Resistance Welding Machines
- Brazing Sets (Oxy-Acetative)
- Deep Penetration Welding Machines
- Capacitive Discharge

CABLE PLANT MACHINERY

- FEP/PFA Extrusion Lines
- PVC/XLPE Extrusion Lines
- Silicon Extrusion Line
- Armoring Lines
- Laying Lines
- Copper Drawing with Online Annealing Machines
- Conductor Stranding Machines
- Braiding Machines - High Speed and Regular
- Vertical Lapping Machines & Stranding Machines
- Tape Wrapping Machines
- PTFE Extrusion and Tape Roll Down Plant
- Buncher Machines
- Spark Tester & Diameter Testers

NICKEL ALLOY PLANT

- Vacuum Induction Furnace
- Pit Annealing Furnace
- Bull Block Drawing
- Nickel alloy multi die drawing machine
- Bright Annealing Furnace

MACHINING

- CNC Turning Centers
- Turn Mill Centers
- VMC Machines
- Deep Hole Drilling Machines upto 1500mm Drilling Capacity
- Milling Centers
- Manual Lathe Machines

HEATER PLANT

- Swaging Machines
- Laser Marking Machines
- Laser Cutting Machine
- Bright Annealing Machine
- Engraving Machines
- Coil Making Machines
- High Frequency Annealing Machines
- MgO Filling Towers
- Rolling Machine & Skinning Machines
- Vacuum Presses
- CNC Breading Machines

MI CABLE PLANT

- Draw Bench 50 meters
- Annealing Furnaces
- MI Polishing Machines
- MgO Plant
- Polishing Machine

TESTING AND CALIBRATION

- NABL Accredited Calibration Lab -196°C to 1600°C for Contact and upto 2900°C for Non Contact Sensors
- NABL Accredited Testing Centre for cables & wires.
- Computerized Calibration System
- Fixed Point Cells-TPW, Ga, Sn, Zn, & Al and AC Bridge for Primary Standards
- Digital Radiography Setup for Junction Integrity
- PMI Setup for Chemical Analysis of Alloys
- Pressure Test Setup
- Helium & Nitrogen Leak Detector
- Profile Projector
- Dye Penetration Test Setup for Weld Joints
- Microscopic Junction Check
- Auto Clave Testing
- Response Time Test, least count 1 msec.
- Ultrasonic Thickness Test
- Giga Ohm Insulation Resistance Testers
- Mechanical checks - lengths, gauges, concentricity checks
- Conductor Resistance Test
- Test for thickness of Insulation and Sheath
- Physical test for Insulation and Outer Sheath
- High Voltage Test Sets
- Flammability Test & Tensile Testers

Thermocouple & RTD

THERMOCOUPLES/RTD's FOR THERMAL VALIDATION AND QUALIFICATION

Tempens manufacturing thermocouples,RTD's & their assemblies, which are optimally suited for validation tasks: -

- Solid and stranded thermocouple wires available in rolls.
- Thermocouples copper / constantan type T with narrow tolerances (special limits, and premium grade) with moisture Stopper solution for Auto calve
- Special Capsule type RTD's, Moisture Proof RTD's for Autoclave
- Thermocouples are normally used with different validation systems, such as Kaye Validator/Digistrip and Ellab E-Val Flex thermal validation system.

We offer NABL Calibration for Validation Thermocouple & RTD's

MOIST HEAT STERILISATION (AUTOCLAVE)

Thermocouples

With special Sleeves & Needle Type with Moisture Stopper.

Type : "T" (Cu-CuNi)
Temperature Range : -100-200°C

Insulation Type

FEP : -70 to 200°C continuously, 316°C peak
PFA : -70 to 260°C continuously, 285°C peak

Accuracy

At 40°C : ±0.5°C
At 121°C : ±0.5°C



RTD's

Avoid moisture inside probe, which is caused by Autoclave pressure cycling.

Type : Capsule Type RTD
Temperature Range : 0-150°C

Insulation Type

FEP : -70 to 200°C continuously, 316°C peak
PFA : -70 to 260°C continuously, 285°C peak

Accuracy

At 40°C : ±0.1°C
At 121°C : ±0.3°C



TEMPERATURE SENSOR FOR VALIDATION

DRY HEAT STERILISATION (TUNNEL)

Thermocouples

Special TIP Type & Needle Type

Type : "T" (Cu-CuNi)
Application Temperature : 160-300°C

Insulation Type

Kapton : 350°C continuously, 380°C peak

Accuracy

At 40°C : $\pm 0.5^{\circ}\text{C}$
At 121°C : $\pm 0.5^{\circ}\text{C}$
At 300°C : $\pm 1.2^{\circ}\text{C}$



RTD's

Type : Capsule Type RTD, PT 100,
3 & 4 Wire

Application Temperature : 160-300° C

Insulation Type

Kapton : 350°C continuously, 380°C peak

Accuracy

At 40°C : $\pm 0.1^{\circ}\text{C}$
At 121°C : $\pm 0.3^{\circ}\text{C}$
At 300°C : $\pm 0.5^{\circ}\text{C}$



LYPHOLIZER (FREEZE DRYER)

Thermocouples /RTD's

For cooling plate temp. measurement

T/C Type : "T" (Cu-CuNi)
RTD Type : Capsule Type
Application Temperature : -40 TO 80°C

Insulation Type

PFA : -70 to 260°C
continuously, 285°C
peak



TEMPERATURE SENSOR FOR PROCESS

Tempens manufacturing Thermocouples,RTD's & their assemblies, which are optimally suited for Process.

- Simplex, duplex, and multi Element RTD's /Thermocouples for Storage Tanks, Vessels, Reactors, Distillation Columns.
- Thermocouples with drilled bar stock Thermowells .
- RTD's / Thermocouples with Flame Proof Head & Indicators.
- Class A ,Class B, 1/3,1/5,1/10 DIN RTD's.
- Special Class thermocouples.
- RTD / Thermocouple Probes (Portable Temp. Measurement)



STORAGE TANKS, VESSELS, REACTORS, DISTILLATION COLUMNS

Type :

Thermocouples : Simplex, duplex, and multipoint.

RTD's : Simplex, duplex & triplex.

Head : Ex-Proof, II A/II B.

Thermowell : Drilled bar stock

Normally used RTD & "K" type Thermocouple with 6,8, or 10 mm OD, and 2, 3 Meter Long , with Drilled bar stock thermowell SS316 /HRS446



CIP (CLEANING IN PLACE) / SIP (STERILISATION IN PLACE)

- Clean-In-Place (CIP) is an everyday practice in Pharma manufacturing and involves cleaning reactors, pumps, heat exchangers, distribution loops and process filling machines.
- Steam-In-Place (SIP) system is widely used for in-line sterilization of various processing equipment.
- Temperature Sensors Use in CIP/SIP : Sanitary RTD's

Sanitary RTD's

Temp. Range : -20 to 250°C

Type : Simplex, Duplex

Class : A

Head : Die Cast Aluminum, SS Head.

Process Connection : Tri-clover Fitting, Fixed Fitting

Fitting :

Thermowell : with or without Tri-clover



OTHER PRODUCTS

TEMPERATURE GAUGE AND PRESSURE GAUGES



TEMPERATURE TRANSMITTER



Head Mounted Type



Din Rail Type

WIRELESS TRANSMITTER & RECEIVER



PROBE TRANSMITTER



Sensor type

RTD & Thermocouple

Measurement Range

RTD: -100-650°C , T/C:- 270-1760°C

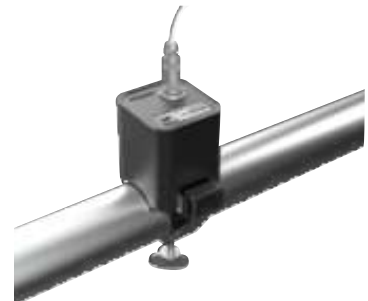
Switch-on delay

<2.5 Sec. after 15 Minutes

Temperature Effect

<±0.2%/25°C

NON INVASIVE CLAMP SENSOR



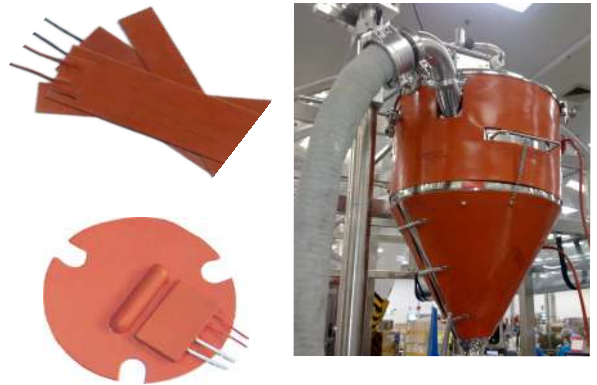
Conventional invasive type sensors such as RTDs and thermocouples with Thermowells were used to measure process media temperature inside a pipe. Surface temperature sensors were also used to approximate the inside temperature.

Temperature Range	0°C - 100°C
Ambient Temperature	0°C - 40°C
Accuracy for metal	±3°C
Response time	7 sec.
Standard pipe size 1,	1, 2 inch
Components	head, Clamp and electronic box
Analog Output	Analog Output 0 - 20mA, 4 - 20mA, 0 - 10V
Digital Output	USB 2.0 RS-232/RS-485 interface card (Optional) *At a time only one digital output possible

INDUSTRIAL HEATERS

Silicon Rubber Heaters

- Temperature Range up to 250°C
- High Electric Strength , Flame retardant, Non Toxic.
- Easy to install on variety of surface including curved surfaces.
- Uniform heating, Adaptability, Long Life
- Good for heating drums, de-icing, vending machines, atms, aircraft, cars, and maintaining a comfortable temperature in medical equipment, such as CAT scanners.



Tubular Heaters

- Used in various industrial processing such as liquid immersion (with threaded fittings), in free air, clamped on, wrapped around, cast into aluminum, bronze or cast iron.
- They may be installed into machines grooves or drilled holes in metal parts.



High Watt Density Cartridge Heaters

- Temperature Range : upto 450°C
- Material : Ss304, SS316, Incoloy
- Configurations : Swaged in Leads, Crimped on Leads, Post terminals, Right Angle Leads, Teflon Seal, Silicon Rubber Seal, Epoxy Seal, Swaged in Braid, Right Angle Stainless Steel Braid, SS Flexible Conduit, Hex head pipe fittings, Flanges etc.



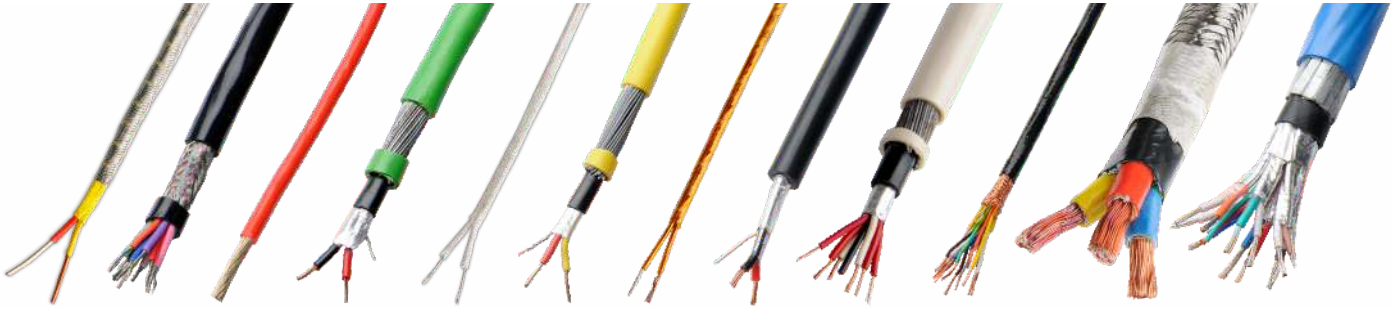
Ceramic Band Heaters

- Reduce power consumption
- Conserve heat
- High degree of flexibility
- Uniform heat distribution
- Various termination styles

Ceramic band heaters are medium-to-high temperature heaters that have 648°C as a maximum working temperature. These durable heaters can have optional in-built ceramic fiber jackets that make them energy efficient. Ceramic band heaters are available with different terminal styles, are fully flexible, and can accommodate holes and cut-outs.



CABLE



Wide range of insulations and conductor configurations are manufactured in house by our cable manufacturing Facility. Compensating and Extension Cables for thermocouples J,K,T,E,N,R,S,B Types. RTD Cables in three wire & four wire configuration for simplex and six & eight wire for duplex are available.

Construction	Single or Multi Pair
Voltage Grade	Up to 1.1 KV
Conductor	TC, EX, C (as per below table)
Type of Conductor	K, T, J, E, N, R, S, B, D, C
Conductor Size	AWG 12 to AWG 34
Conductor Stranding	Solid or Multi Strand
Core Insulation	PVC, XLPE, LSZH, PE, PTFE, FEP, PFA, PEEK, Silicon, ETFE, Polyimide, Fiber Glass, Ceramic Fiber, Alumina Yarn
Screening	Aluminum Foil Type / Mesh Braided Type
Inner/Outer Sheath	PVC, LSZH, PTFE, FEP, PFA, ETFE, Silicon, Polyimide, Fiber Glass, Ceramic Fiber, PUR, Alumina Yarn
Armouring	G.I. Armouring/SS Braiding (For High Temperature insulations)
Color Code	As per below table
Standards	ANSI MC 96.1, IEC 584.3, IS 8784

Other Cables for Signal, Control and Instrumentation are available with variety of insulation and various configurations.

WIRE INSULATION IDENTIFICATION AND APPLICATION GUIDE

INSULATION CODE	INSULATION	APPEARANCE OF CABLE	TEMP. RANGE INSULATION	ABRASION RESISTANCE	FLEXIBILITY	WATER SUBMERSION	RESISTANCE TO:	
							FLAME	HUMIDITY
P	Polyvinyl Chloride (PVC)		-40 to 105°C	GOOD	EXCELLENT	GOOD	GOOD	GOOD
EF	FEP		-200 to 200°C	EXCELLENT	GOOD	EXCELLENT	EXCELLENT	EXCELLENT
S	Silicon		-40 to 200°C	GOOD	GOOD	EXCELLENT	GOOD	EXCELLENT
T	PTFE		-267 to 260°C	EXCELLENT	GOOD	EXCELLENT	EXCELLENT	EXCELLENT
PF	PFA		-260 to 260°C	EXCELLENT	GOOD	EXCELLENT	EXCELLENT	EXCELLENT
K	Kapton		-267 to 316°C	EXCELLENT	GOOD	GOOD	EXCELLENT	EXCELLENT
F	Fiber Glass		-73 to 600°C	GOOD	GOOD	EXCELLENT	EXCELLENT	EXCELLENT
CF/SF	Ceramic Fiber/ Silica		-72 to 800°C	POOR	GOOD	POOR	EXCELLENT	EXCELLENT
RF/NF	Refrasil/Nextel Silica yarn		-73 to 1200°C	POOR	GOOD	POOR	EXCELLENT	FAIR

PYROMETERS

Radiation Pyrometers

- Wide range of non contact pyrometers are available for handheld and online applications for temperature range from - 100 3200°C
- Single Colour & Two Colour Pyrometers
- Special Molten Aluminum Pyrometers
- Fibre Optic Pyrometers
- Portable Pyrometers – TCT 750, TI 1500, TI 2400



THERMAL IMAGERS

Model	ThermEye 256	ThermEye 256M
Resolution	256 x 192	251 x 192
Detector	Uncooled Microbolometer	Uncooled Microbolometer
Temperature Range	-20°C ... 550°C	-20°C ... 550°C (Optional upto 1200°C)
FOV	56° x 42.2°	24° x 18° (Optional 46°, 12°, 7°)



CALIBRATION EQUIPMENT

Model	Range	Stability
BATH		
CALsys -80/50	-80....+50°C	±0.05°C
CALsys -35/200	-35....+200°C	±0.01°C
CALsys 250	50....+250°C	±0.1°C
DRY BLOCK		
CALsys -190/-80	-190.... -80°C	±0.1°C
CALsys -100/40	-100.... +40°C	±0.04°C
CALsys -30/110	-30.. +110°C	±0.07°C
CALsys 650	50.. +650°C	±0.05°C
CALsys 1200	250...+1200°C	±0.3°C
BLACKBODY		
CALsys LBBH	50.....+500°C	±1.0°C
CALsys 1200 BB	300....+1200°C	±0.5°C
CALsys 1500 BB	500....+1500°C	±1.0°C
CALsys 1700 BB	500....+1700°C	±2.0°C



- Temperature Range : -80 to 1700°C
- Measuring instruments available with high accuracy
- Master Sensors - High Accuracy



Services

Calibration Services

Tempsens Calibration Center is an independent unit of Tempsens instruments (I) Pvt. Ltd, having laboratories at Udaipur, Vadodara, Bangalore & Indonesia. It is accredited for wide range of temperature calibration services.



CC-2840
Udaipur
Lab

CC-2903
Vadodara
Lab

CC-2330
Bangalore
Lab

LK-345-IDN
Indonesia
Lab

IN HOUSE CALIBRATION FACILITY

Quality Measured/ Instruments	Temperature Range	Calibration & Measurement Capability
Contact Type RTD, Thermocouples Thermometers	-196°C	0.05°C
	-80°C	0.03°C
	-180 To -80°C	0.05°C
	>10°C to 250°C	0.04°C
	>250°C to 650°C	0.10°C
	>650°C to 1200°C	1.30°C
Non Contact Type Pyrometer	>1200°C to 1600°C	2.60°C
	0°C to 250°C	1.5°C
	>250°C to 500°C	2.44°C
	-30 to -15°C	2.40°C
	-15 to 250°C	1.6°C
	>500°C to 1700°C	3.2°C
	>1700°C to 3000°C	5.84°C



Tempsens is the only private sector Laboratory in the country with accredited Fixed Point Temperature calibration Facilities. The lab has highly stable calibration furnaces, measuring instruments and accurate master sensors traceable to National and International Standards.

ON SITE CALIBRATION FACILITY

Quality Measured/ Instruments	Temperature Range	Calibration & Measurement Capability
Contact type RTD, Thermocouples Thermometers	-25°C to 0°C	0.07°C
	>0°C to 140°C	0.04°C
	>140°C to 250°C	0.09°C
	>250°C to 650°C	0.12°C
	>650°C to 1200°C	1.30°C
Non Contact Type Pyrometer	0°C to 250°C	1.50°C
	>250°C to 500°C	2.40°C
	>500°C to 1200°C	2.5°C
Multipoint Position Calibration of Chamber, Oven, Furnaces (Thermal Mapping(TUS))	-80°C to 200°C	0.50°C
	>200°C to 1200°C	2.0°C

The calibration center functions as per ISO 17025 / NABL standards. Calibration of contact type sensors can be made in temperature range of -196°C to 1600°C and Calibration of non contact type sensors can be made in temperature range 0°C to 3000°C. Further the laboratory is accredited for onsite temperature calibration.

The lab offer both at Lab & On-Site Calibration of Furnace/Bath from -80°C to 1600°C and Black Body Calibration from 50°C to 1700°C.

Furnace/Chamber Calibration (TUS) with multiple sensors from -80°C to 1200°C is also in the scope of the lab.

PRIMARY TEMPERATURE CALIBRATION FACILITIES

Quality Measured/ Instruments	Temperature Range	Calibration & Measurement Capability
Calibration of SPRT/PRTS/ thermocouple etc.	Triple Point of Water (0.01°C)	0.0038°C
	Melting Point of Gallium (29.7646°C)	0.0065°C
	Freezing Point of Tin (231.928°C)	0.0065°C
	Freezing Point of Zinc (419.527°C)	0.0071°C
	Freezing Point of Aluminum (660.323°C)	0.0075°C
Calibration of Thermocouple at Secondary Fixed Point	Melting Point of Gold(1064.18 °C)	0.72°C
	Melting Point of Palladium(1554.8 °C)	0.83°C





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