

C A T A L O G



THERMOWAY was founded in **1995**. We started as a small domestic workshop with quality made thermocouple and RTD products. Over the years, we continue to grow and expand to become the leading manufacturer and supplier in industrial temperature measurement. Today, we have clients all over the world from various industries, including Steel Industry, Aerospace, Semi-Conductor, Solar Industry, LED, Power Plants, Petro-Chemicals, Cement, Food, and other high-tech manufacturing.

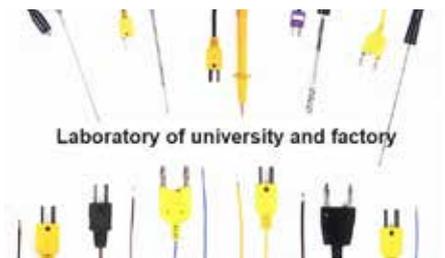
Our philosophy is **“Continue to improve quality and exceed client expectations”**. Our experienced team provides the best system product design and improvement solutions for process temperature control in response to different harsh environments faced by customers in different industries.

Professional Customization Service is the core strength of THERMOWAY. The diversified customized products can be applied in a wide range of temperature environments from -200°C to more than 2200°C.

In order to provide clients with more exhaustive services, we established our **Calibration Center (ISO/IEC 17025 certified temperature calibration laboratory)** in 2001. We provide customers reliable temperature calibration services. Calibration scope includes thermocouples, thermal resistors (RTDs), temperature measurement instruments and equipments. It is currently the **TAF certified laboratory** with the widest calibration range and the strongest capabilities in Taiwan.

As a leader in the industry, **constantly pursuing technological breakthroughs, innovations, and leading the market** are the goals and directions that THERMOWAY has always adhered to.

Our brand  **THERMOWAY** meets all needs in all areas.



History

1995	Feb	THERMOWAY was founded	
1998	Jul	ISO 9002:1994 certified	
1999	May	Expanded & relocated to current location - Shijr, New Taipei City	
2001	Mar	Independent Testing Laboratory founded with ISO/IEC GUIDE 25 certified	
2002	Mar	BS EN ISO 9001:2000 certified	
	Aug	ISO/IEC 17025:2005 certified	
2007	Apri	Tainan Office was founded	
2008	Mar	TAF Calibration Laboratory certified	
	Sep	Obtained NEPSI explosion-proof certification Ex d11C T1-T6	
2009	May	Expanded 2nd plant focusing on semiconductor industry	
2010	Jul	ISO 9001:2008 & QC 080000 certified	
2013	Jan	Japan Branch was founded	
	Mar	Taichung Office was founded	
	May	Expanded first and second plants for increasing business lines and production capacity	
2016	May	ISO 14001:2015 certified	
2017	Mar	Dust Ex-Proof Rated certified by ITRI	
2017	May	Vietnam Branch was founded	
2019	Jun	Ex-Proof Rated Junction Box certified by ITRI	
2020	May	ISO/IEC 17025:2017 certified	
2021	Mar	Ex-Proof Multi-Pair Thermocouple(RTD) certified by ITRI	
	May	3rd plant was founded	

High Accuracy RTD Wafer

Thermoway's RTD Wafer is designed for processes requiring high precision temperature measurements such as semiconductor photoresist track systems, wafer probers, and many other types of semiconductor fabrication equipment.

With high measurement accuracy and stability result from the careful design integration, the RTD sensors, bonding and encapsulation materials and the four-wire resistance measurement method are the key intergrated elements.



Features

- Temperature Range: -80°C to 300°C
- Number of Sensors: 1 to 160 points
- Calibration Service
- Software and Analysis System

Applications

- Measuring and recording wafer temperature of the process cycle: loading, heat-up, steady state, cool-down, and unloading.
- Improving wafer temperature control and uniformity, maintaining narrower process temperature windows.
- Managing production processes that have tight thermal performance specifications or providing inputs to SPC systems.
- Optimizing wafer processes during hardware or process development.
- Testing and benchmarking wafer fab equipment during final qualification, fab start-up, and requalification of repaired or upgraded systems.

Specifications

Temperature Range:	-80°C to 300°C
Wafer Size:	6", 8", 12"
Element Type:	Thin Film Platinum
Element Resistance:	100Ω, 1000 Ω nominal at 0°C
Resistance Alpha Value:	0.00385
Max. Measurement Current:	200 μA
Accuracy with Calibration Correction:	±0.1°C absolute accuracy, ±0.03°C sensor to sensor accuracy Also available in customized high accuracy ±0.05°C @ 0°C
Resolution:	0.01°C
Type of Connection:	3-Wire or 4-wire resistance measurement with common current source return
Lead Materials:	Polyimide coated copper
Cable Construction:	Polyimide film flat cable section transitioning to a silicon rubber round flex cable.
Connection:	D-type, high density, sub-miniature with 68 pins.

High Accuracy Data Logger

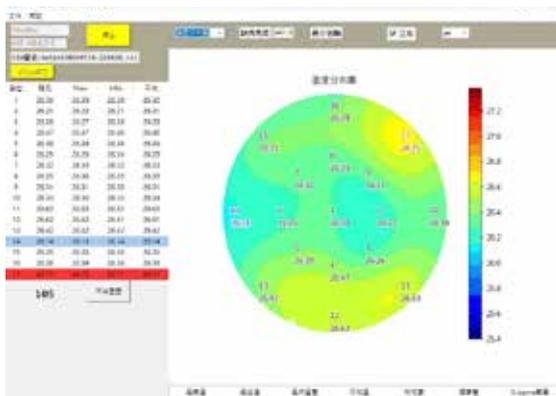
Thermoway's RTD Data Logger works perfectly with the RTD Wafer. It can collect, store, analyze and display temperature measurement data in reaction chambers and process equipment data. The data logger offers the ultimate in resolution (0.01 °C) and accuracy (0.01°C). Along with temperature it can also be used to measure resistance and voltage.

The data loggers are powered by a built-in, re-chargeable battery to allow purely stand-alone performance. The data loggers are fully programmable, initially via a built-in USB interface, and thereafter wirelessly via the WiFi link using included Windows-based software. It is the ideal tool for helping users improve the production efficiency of chip factories, and the yield rate of chip output.



TW-TR-23001

Software & Analysis System



- Retrieve, report, analyze, and visualize data
- Embeddable results for real-time analytics and reporting
- Support data exploration and collaboration, enabling people of all skill levels to look rapidly at data from multiple perspectives
- Ideal tool for helping users improve the production efficiency of chip factories, and the yield rate of chip output. With graphical analysis tools such as heatmap and line graph, can help user easily understand the current status of process.

Specifications

Number of Channels:	1 ~ 17 CH (4-Wire)
Measurement of Accuracy:	±0.01°C
Temperature Range:	-200°C ~ 850°C (Full Range 0.01°C)
True Universal Inputs:	PT100/200/500/1000Ω
Resistance Alpha Value:	0.00385
Fastest Sampling Rate:	>=10HZ/CH
Off Set:	5 Points
Communication:	modBus -RTU, Bluetooth & Wi-Fi
Sensor Connection:	THD0518-68CL
Digital Output:	USB
Power Connection:	Aviation Connector
Power Supply:	90~250VAC 50/60HZ
Operation Temperature:	-40°C ~70°C, Humidity <=95%RH
Dimensions:	L: 106 x W: 35 x H: 84mm
Safety Standard:	ROHS / REACH / CE

WiFi-Connectivity Temperature & Humidity Sensor, with Monitoring & Alarming System

TW-WiFi Series

TW-WiFi series is designed specifically for environmental monitoring. It can continuously and stably monitor the temperature and humidity changes in different environments such as hospitals, laboratories, medical equipments, server rooms, and transportation processes.

According to client needs, our transmitter can be combined with thermocouple, RTD probes, uploading the data to our Cloud Database through WiFi, customers can observe the temperature and humidity in real time through the computer or smart phone website, and directly set up the alarm condition, the system will send a message via LINE, e-mail or a relay may be selected.



Features

- With WiFi Connection, there is no need for expensive wireless receiver apparatus; you can also share personal hotspot.
- Smart Cloud Service provides real-time data monitoring: Using WiFi network to connect our database, and instantly respond in the website.
- Customers can do configuration, monitor, and receive the alarm in our system website, without updating extra software.
- According to environment condition, we provide external sensors such Thermocouple and RTD.
- Wide range of applications: Suitable for low temperature storage space, laboratory, server room, warehouse and other indoor environment monitoring. It can be used to monitor numerous locations by adding additional transmitters.

Specifications

THERMOCOUPLE SENSOR	Type:	K, E, J, T, N, R, S, B (Customized)	RANGE WiFi 2.4GHz, Distance: 30-50M
	Temperature Range:	-200~+1750°C; depending on sensor type	
	Accuracy:	±0.15%(-20~+85°C); depending on sensor type	
	Resolution:	0.1°C	
	Calibrated Accuracy:	±0.7°C(-20~+85°C)	
RTD SENSOR	Voltage Protection:	±45V	OPERATING ENVIRONMENT -20~+60°C 5~95%RH non-condensing
	Filtering Protection:	50/60Hz	
	ESD Protection:	±2000V	
	Type:	PT100, PT1000; 2W/3W/4W (Customized)	
	Temperature Range:	-200~+800°C; depending on sensor type	
DIGITAL SENSOR	Accuracy:	±0.5°C (max. 0.05%)	POWER SUPPLY 4.7 – 6.0 VDC
	Resolution:	0.1°C	
	ESD Protection:	±2000V	
	Temperature Range:	-40~+125°C	
DIGITAL SENSOR	Humidity Range:	0~100% RH	
	Accuracy:	±0.4°C(Max.), -10~+85°C	
	Relative humidity:	±3%RH(Max.) 0-80%RH	

NEW PRODUCT

Extra High Strength Platinum Thermocouple Wire: XXR & XXS

XXR & XXS Platinum Thermocouple Wire withstands the harshest environment and the most demanding applications. We offer type R and S wire, and it can be manufactured in any diameter down to 0.03mm. With various capability tests completed, XXR & XXS is available commercially to meet your requirements.



- ***Lasts 3 to 5 times longer than general platinum thermocouple wire!***
- ***Lasts 400 times longer than standard thermocouple wire!***
- ***Meets IEC60584-1:2013 class 1 tolerance***

■ Superior strength for reliable measurements

XXR & XXS has a stronger platinum leg by microalloying zirconium with the platinum to stabilize the grain boundaries, which prevents the formation of bamboo structures.

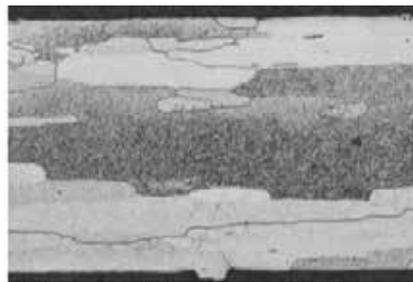
It lasts up to 400 times longer than standard thermocouple wire, offering a reliable temperature reading in harsh environments. We've proven this through accelerated lifetime testing, applying high loads at high temperatures to the wires. It also shows exceptional accuracy, meeting IEC60584-1:2013 class 1 tolerance. With reducing drift during thermal cycle testing, it has been confirmed that it has a better EMF output stability than conventional thermocouples.

■ High temperature durability

During stress testing, it maintains excellent functionality after 2450 hours at 1400°C with 400psi tensile loading. Below micrographs show that under the same tensile loading per unit area, standard platinum thermocouple wire forms a bamboo structures and fails after just six hours.



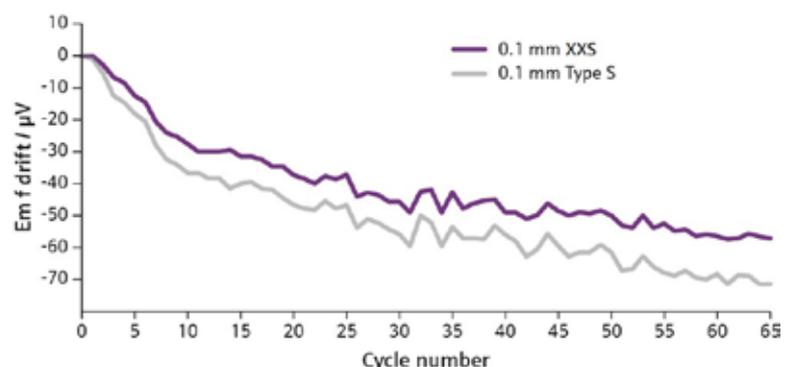
Micrograph of standard Pt wire after 6 hours at 1400 °C under a tensile stress of 2.76 Mpa, showing a large grain structure and resulting grain boundary movement.



Micrograph of XXR wire after 2450 hours at 1400 °C under a tensile stress of 2.76 Mpa, showing the grain boundary pinning effects that give it superior strength and durability.

■ Minimal drift

Over a 900 hour thermal cycle, both XXR and XXS wires are more stable, with standard thermocouple wire drifting at a faster rate. And we saw similar trends under a more extreme temperature range.



Infrared Blackbody Calibration Source for Body Temperature Guns

Blackbody Calibrator TB2001 is the ideal calibration source of infrared ear thermometers and infrared forehead thermometers, and it can be used for infrared surface screening instruments. Its operating temperature range is from Room Temperature+5°C to 50°C (RT+41°F to 122°F) with high accuracy and stability.

- Modern design, simple setup and operation
- Portable and rugged design, with light weight, not only suitable for laboratory calibration but also on-site work
- Calibrates infrared thermometers quickly and accurately
- Optional RS485 for remote control



↑ Easy operation design



Technical Specifications	
Calibration Temperature Range	room temp.+5°C~50°C
Stability	±0.1°C
Temperature Resolution	±0.1°C
Cavity Diameter	Ø70mm
Cavity Emissivity	≥0.95
Power	100~240VAC, 50/60Hz
Weight	2.5 kg
Dimensions	120*120*275mm
Ambient Temperature	0°C~65°C

Temperature Digital Display

TW-DD-21001 is designed for thermocouple and RTD sensors, ideal for temperature monitoring in various environments.



- Battery powered, no power cable required, can be used over 5000 times
- After displaying temperature for 10 seconds, the screen will be turned off automatically
- Super shockproof design
- Works with different temperature sensors depending on customer needs, with a wider temperature range
- Used for 4-20mA input

Dry Block Temperature Calibrator

TW-DY series Dry-body Furnace is an on-site heat source that is easy to carry and has fast heating and cooling speed. TW-DY series uses high stability temperature control instrument and alloy materials with good thermal conductivity are used in the homogenizer. The measuring temperature range is from -100°C to 1200°C.

It is widely used in pharmaceuticals (GMP moist heat sterilization, dry heat sterilization), machinery, shipbuilding, chemical industry, biological products, power plants, steel plants, measurement and testing, scientific research, and where temperature calibration is needed on site.



Features

- Lighter and more portable
- Human-machine interface, touch operation, outstanding appearance
- Rapid heating, easy temperature control, automatic adjustment of heating power.
- The accuracy is adjustable. It can be adjusted with one key according to the tolerance of different sensors.
- Data can be outputted via USB, easy to record and search



TW-DY-GTL-D

Specifications

Model	TW-DY-GTL-D	TW-DY-GTL150X	TW-DY-GTL1200X
Temperature Range	-100°C to 40°C	-20°C to 150°C (Indoor Temperature ≤ 22°C)	300°C to 1200°C
Display Resolution	0.1°C / 0.01°C (Customizable)	0.1°C / 0.01°C	0.1°C
Control Mode	Touch Screen	Touch Screen	Touch Screen
Stability	±0.1°C	±0.1°C	±1.0°C
Accuracy	±0.3°C	±0.3°C	±2.0°C
Depth of Checking Hole	155mm	155mm	155mm (Customizable)
Default Display	English Display full color LCD °C or °F	English Display full color LCD °C or °F	English Display full color LCD °C or °F
Diameter of Heat Block	30mm	30mm	30mm
Diameter of Checking Hole	4mm, 6mm, 8mm, 10mm (Customizable)	4mm, 6mm, 8mm, 10mm (Customizable)	6.5mm, 6.5mm, 8mm, 10mm (Customizable)
Number of Checking Hole	4 (Customizable)	4 (Customizable)	4 (Customizable)
Size (H x W x L)	300mm × 160mm × 590mm	280mm × 160mm × 320mm	280mm × 160mm × 320mm
Weight	12kg	8kg	8kg
Power Supply	220 VAC 800W	220 VAC 450W	220 VAC 1550W
Operating Conditions	15°C - 60°C, 80%RH	18°C - 25°C, 30%RH-80%RH	15°C - 35°C, 30%RH-80%RH
Accommodation Mode	Automatically adjust the power and temperature difference		
Language	English (Customizable)		
Standard Accessories	Power line *1, Specification *1, Product Manual *1		

Miniature Temperature Transmitter

ZTR201W is a digital transmitter that is designed for both thermocouple and RTD sensors, and converts sensor output over a configured range to a standard industrial transmission signal. It provides 2-, 3- and 4- wire connections for a wide range of sensors.

Compact Design for more possibilities

The compact design is suitable for different kinds of applications, it is perfectly fitted in limited space and vibrating environment. Not only our standard specifications, but we also provide customized service to satisfy client's need.

ZTR201W can be used to integrate into multiple sensors, machines, and equipments. Our latest technology ensures its long-term stability and accurate performance.

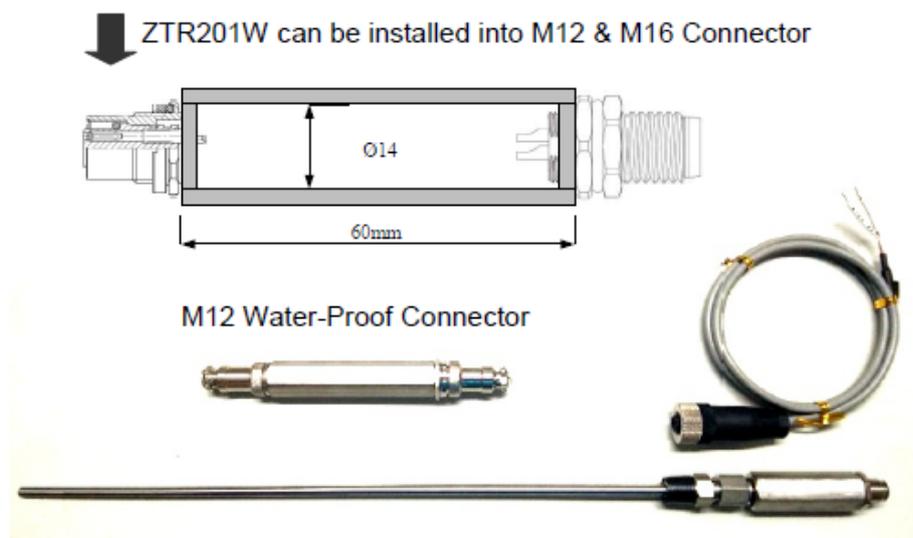


Applications

- Transportation manufacturing(aviation, automobile industry), such as engine monitoring
- Components in medical instruments and equipments
- To integrate with sensors



↑ Combined with indicator, customized design

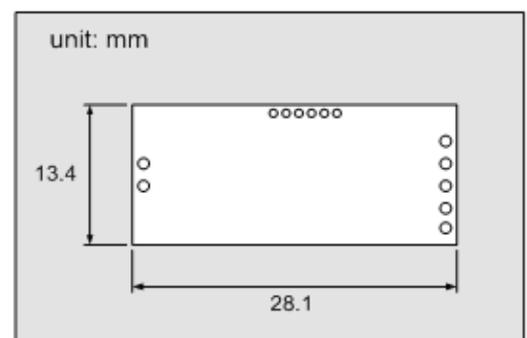


↓ ZTR201W can be installed into M12 & M16 Connector

M12 Water-Proof Connector

Specifications

Output	4 - 20 mA, DC
Input RTD	Pt100, Pt500, Pt1000
Input Thermocouple	Type K, E, J, T, N, R, S, B
Connection	2-, 3- and 4-wire
Accuracy	±0.1% FS
Measuring Range	According to input sensor type
Ambient Temperature	Operating: -20...+55°C
	Storage: -20...+60°C
Power Supply	10 to 40 VDC



NEW PRODUCT

Fine Wire and Thermocouple Welder

► High Quality, with Simple Operation Design

- ✓ Production of high quality thermocouple junctions
- ✓ Easy to operate, high success rate
- ✓ Fast charge
- ✓ High stable energy output
- ✓ Weld wire diameter: 0.08 to 0.8mm



This novel **Fine Wire Welder MINI-2K5A-5** is easy to operate, and no special training is needed, most people can make high-quality welding junction with practice. It is well suitable for production of large amount of thermocouple sensors. Portable design is optional, and with a complete set of accessories, it can help you to achieve more efficient work.

Specifications

Technical Specification		What' s included	
Dimension:	270(L) x 220(W) x 100(H) mm	Power Cord	x1
Weight:	3.6 kg	Foot Switch	x1
Weld Wire Diameter:	0.08 to 0.8 mm	Bonding Carbon Electrode	x1
Duty Circle:	10 welds per minute	Bonding Copper Electrode	x1
Input:	100 - 240 VAC	Safety Glasses	x1
Output:	22 - 55 VDC	Spare Fuse	x1
Power Consumption	Maximum 50W	Removable Plier with Lead	x1

Ordering Information

Model Number: MINI-2K5A-5

Description: Fine Wire Welder, available for any type of TC wire

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Choose your sensor

Step1

Model Selection

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Step2

Protection Tube Selection

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L: Total Length

U: U-Supported Length

E: Effective Length



Step3

Accessories

Page23 Wire

Page27 Connector

Page28 Terminal Box

Page30 Flange



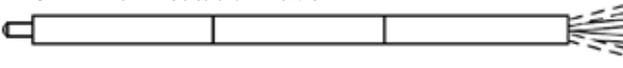
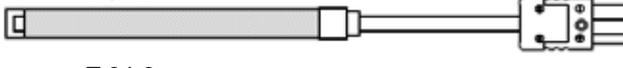
Step4

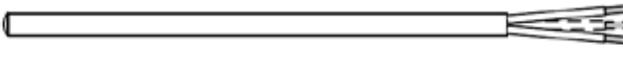
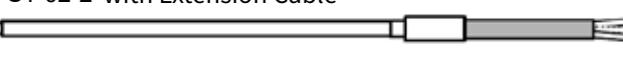
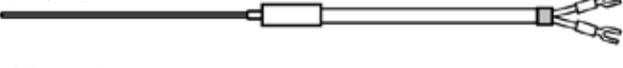
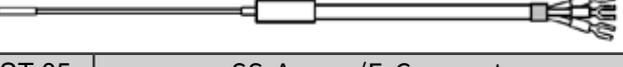
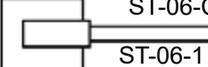
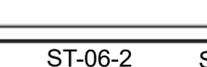
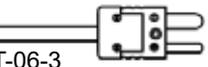
Product details

1. Working Temperature
2. Working Environment
3. Specification and Drawing

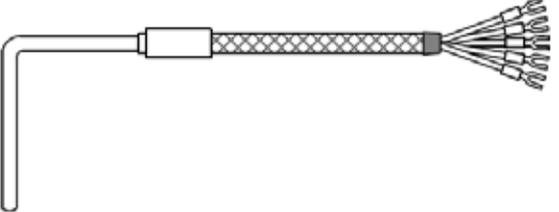
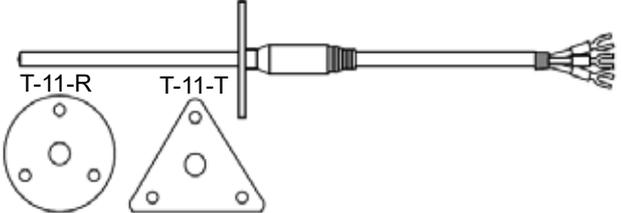
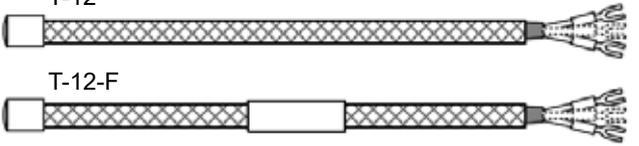


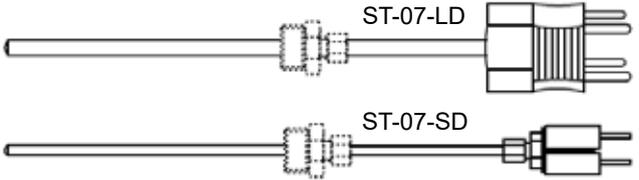
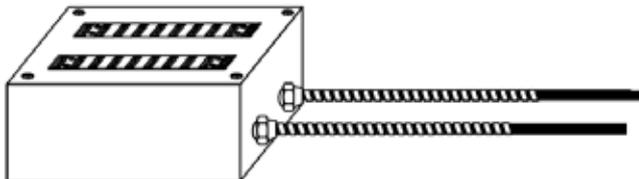
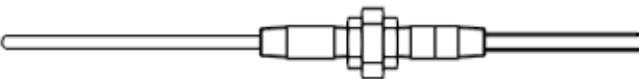
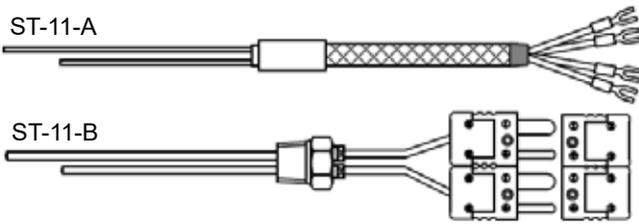
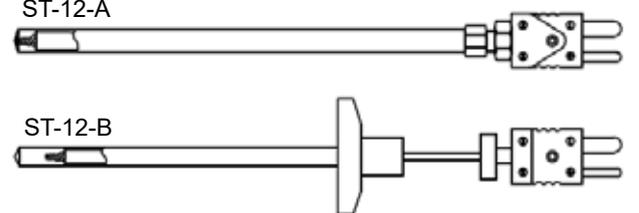
List of Models

Model	Description
T-01	Basic, Bare Wire
<p>T-01-T Bare Wire</p>  <p>T-01-R with Insulation Tube</p> 	
T-02	Exposed Junction
<p>T-02-1</p>  <p>T-02-2</p>  <p>T-02-3</p> 	
T-03	Adjustable Fitting
<p>T-03-1</p>  <p>T-03-2</p> 	
T-04	Surface Measuring
<p>T-04-1</p>  <p>T-04-2</p>  <p>T-04-3</p> 	
T-05	Hex Fitting
<p>T-05-T</p>  <p>T-05-T-RM</p>  <p>T-05-R</p> 	
T-06	Bolt-on Washer
<p>T-06-1</p>  <p>T-06-2</p> 	

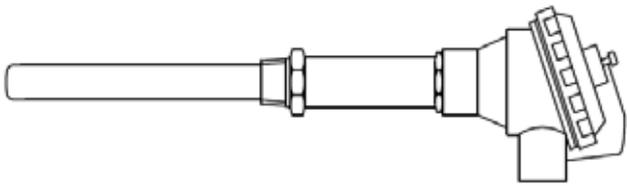
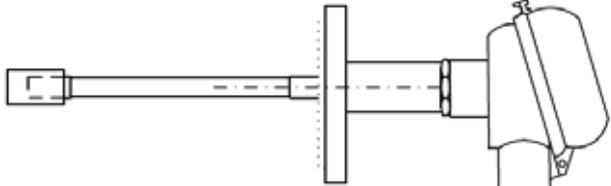
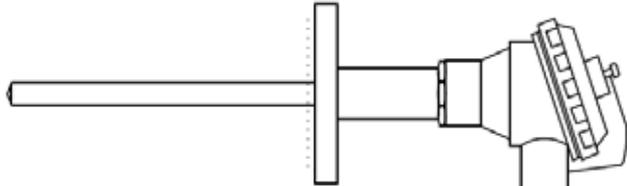
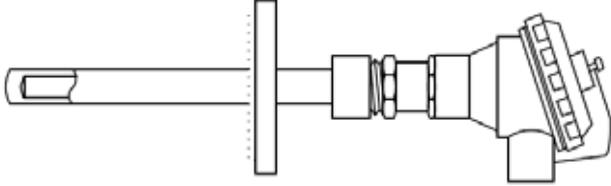
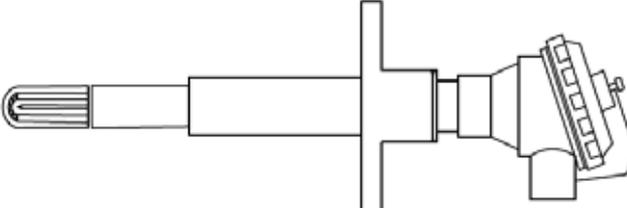
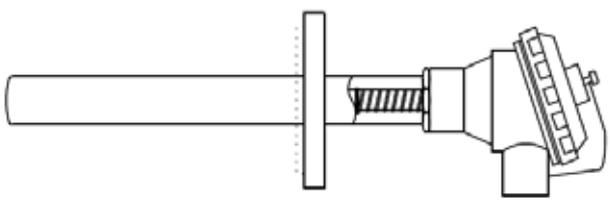
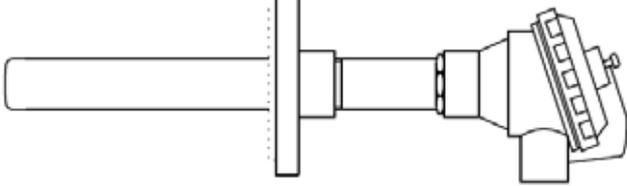
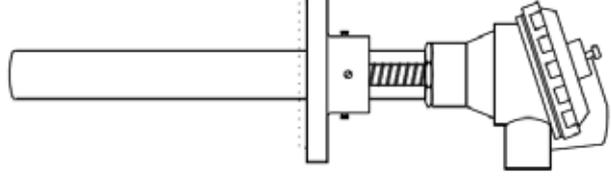
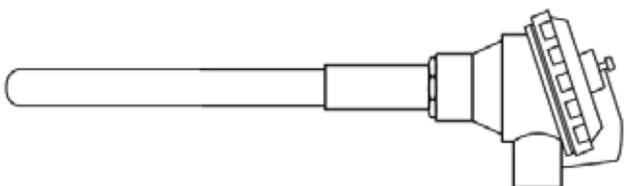
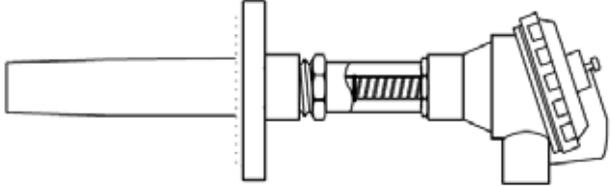
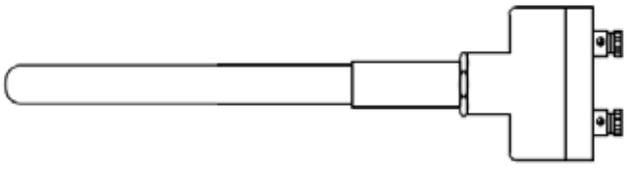
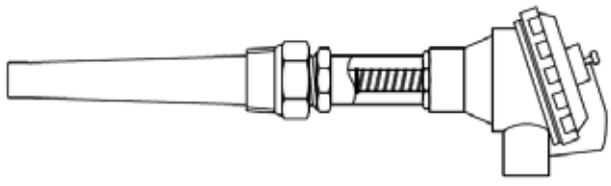
Model	Description
ST-01	Sheathed Cable
<p>ST-01-T</p>  <p>ST-01-R</p> 	
ST-02	Standard Sheathed Cable
<p>ST-02-1 Bare Wire</p>  <p>ST-02-2 with Extension Cable</p> 	
ST-03	Applicational
<p>ST-03-T</p>  <p>ST-03-R</p> 	
ST-04	Ultra Thin
<p>ST-04-1T</p>  <p>ST-04-2T</p>  <p>ST-04-3R</p> 	
ST-05	SS-Armor/E-Connector
<p>ST-05-Y</p>  <p>ST-05-E</p> 	
ST-06	Pad Application
<p>ST-06-C</p>  <p>ST-06-1</p>  <p>ST-06-2</p>  <p>ST-06-3</p> 	

List of Models

Model	Description
T-07	Heat Treatment Application
	2.54mm pitch crimp terminal
	
T-08	Fixed Thread Fitting
	
T-09	Surface Probe
	
T-10	L-Shape RTD & TC Combined
	
T-11	Mounting Bracket
	
T-12	Oil-Filled
	

Model	Description
ST-07	Dual Element
	
ST-08	Boxed Terminal
	
ST-09	Union Style
	
ST-10	Hermetically Sealed Connector
	
ST-11	Dual Element Separated
	
ST-12	Extreme High Temperature
	

List of Models

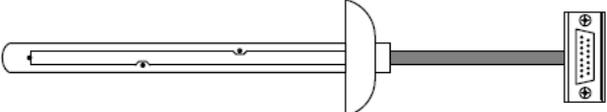
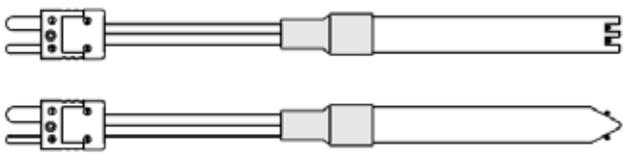
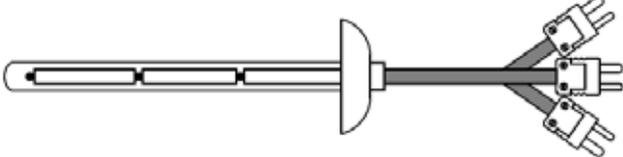
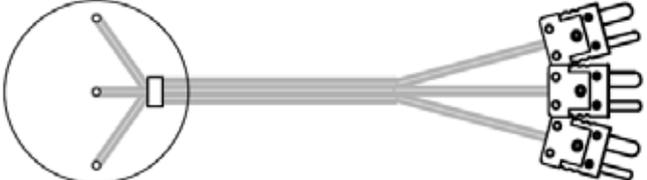
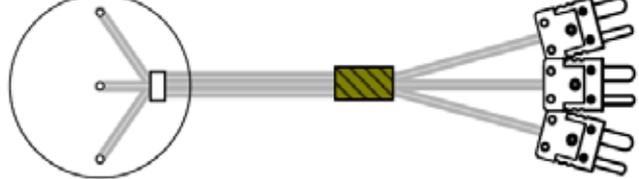
Model	Description	Model	Description
T-13	Screw-in with Nipple	ST-13	Digital Indicator
			
T-14	Flange	ST-14	Water Resistance
			
T-15	Steel Blast Furnace	ST-15	Thermowell with Flange
			
T-16	Thermowell with Flange	ST-16	Adjustable Flange
			
T-17	Ceramic Protection Tube	ST-17	Tapered Thermowell
			
T-18	T Terminal	ST-18	Threaded Thermowell
			

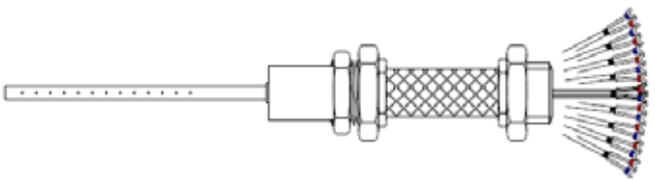
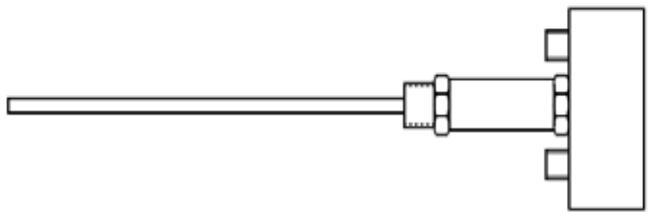
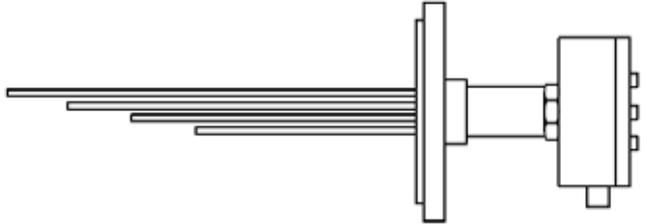
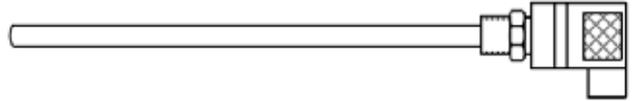
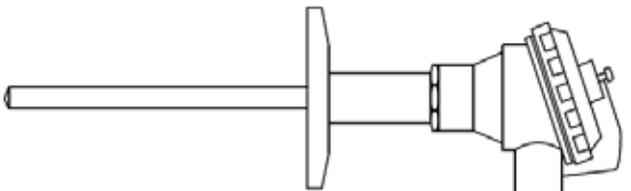
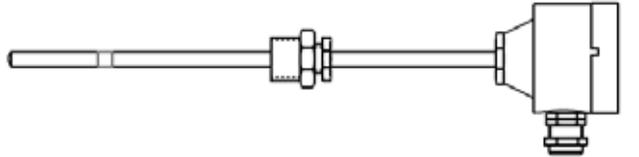
List of Models

Model	Description
T-19	Hex Fitting
T-20	Bayonet
T-21	Compression Fitting
T-22	Armored Adjustable Bayonet
T-23	Stainless Steel Protection Tube
T-24	S.S. Protection Tube with Thread

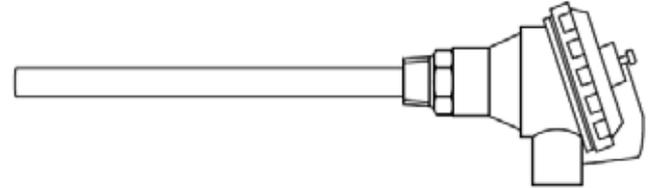
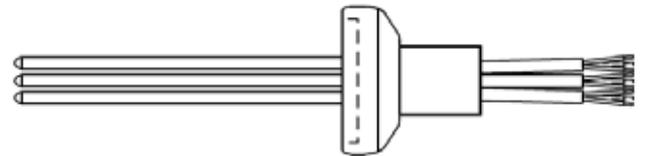
Model	Description
ST-19	L-Shape with Metal Holder
ST-20	Fixed Thread Fitting
ST-21	L-Shape
ST-22	Fitting with Union
ST-23	Adjustable Inner Thread
ST-24	Utility PAD

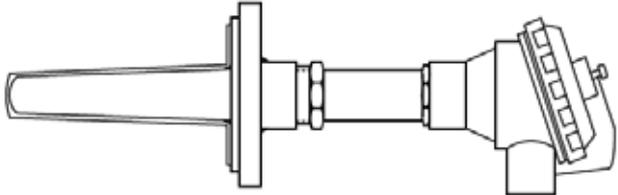
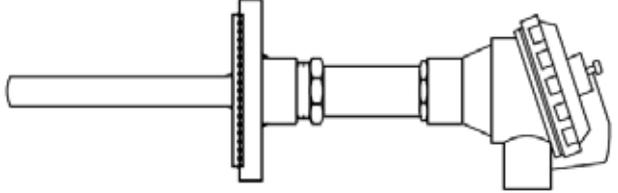
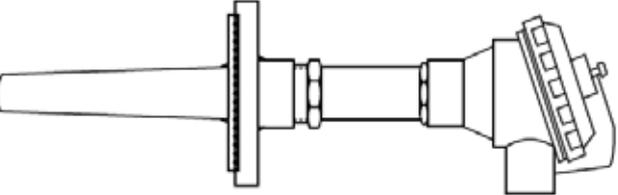
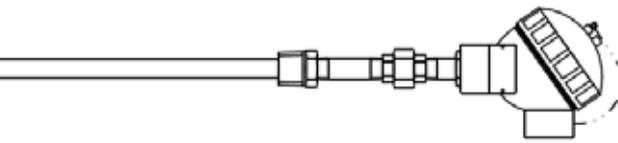
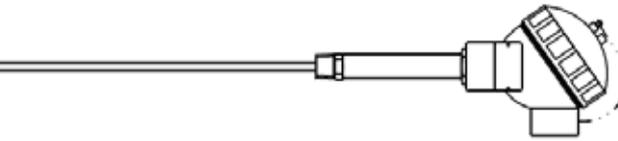
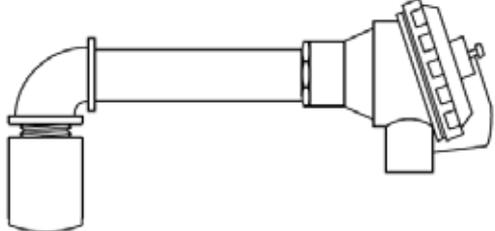
List of Models

Model	Description
SX-01	GT Solar Thermocouple
	
SX-11	PV Solar Thermocouple
	
SX-21	Spike Thermocouple
	
SX-31	Profile Thermocouple
	
SX-41	Wafer Thermocouple
	
SX-51	Wafer Thermocouple for Vacuum
	

Model	Description
SX-61	Multi Point
	
SX-71	Ex-Proof Distrubutional
	
SX-81	Multi Point Ex-Proof with TC Head
	
SX-91	Hirschmann Connector
	
SX-12	Sanitary/Food
	
SX-22	Isolation Style
	

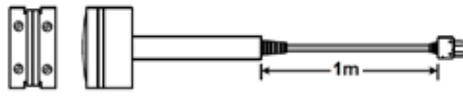
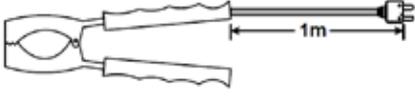
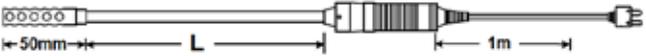
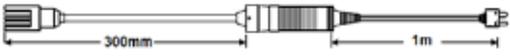
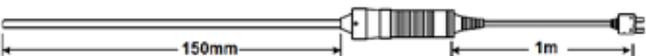
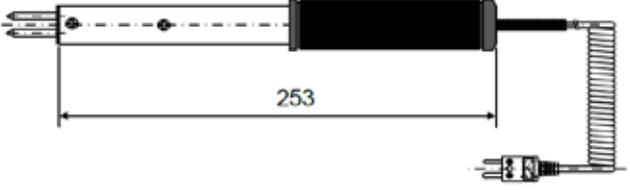
List of Models

Model	Description
TF-11	Heat Shrink TEF Sleeve
TF-11-R	
TF-11-TC	
TF-21	TEF Sleeve
TF-21-R	
TF-21-TC	
TF-31	TEF with Inner Metal Tube
TF-31-R	
TF-31-TC	
TF-41	Hand-Held TEF Tube
TF-41-R	
TF-41-TC	
TF-51	Titanium Tube
	
TF-61	Multi Point
	

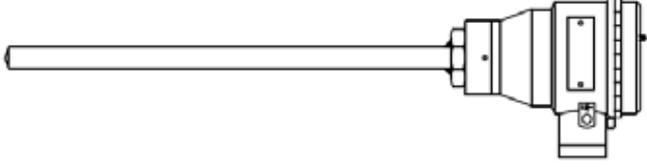
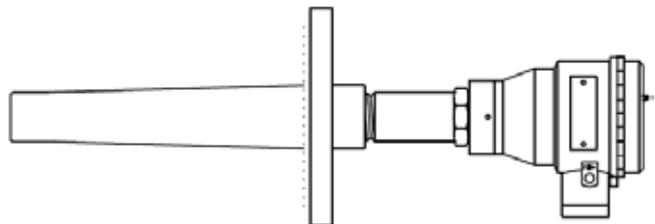
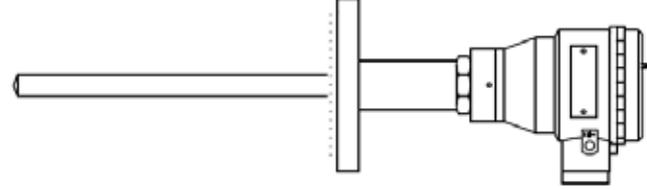
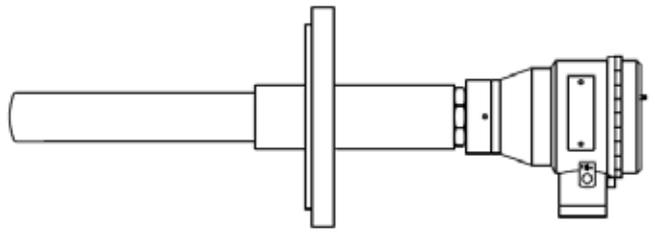
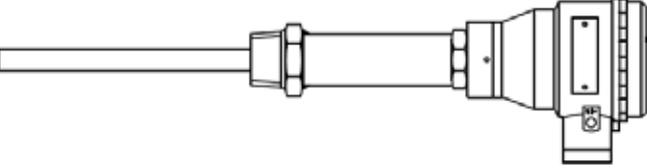
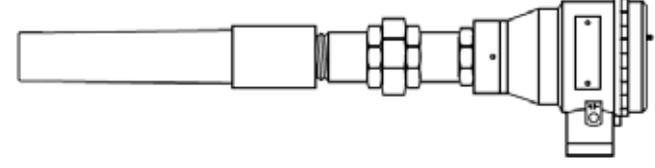
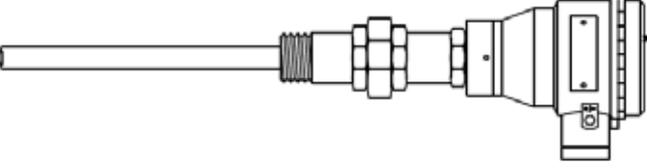
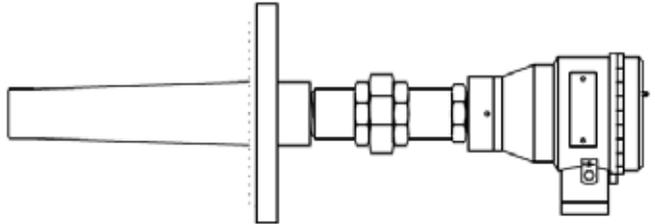
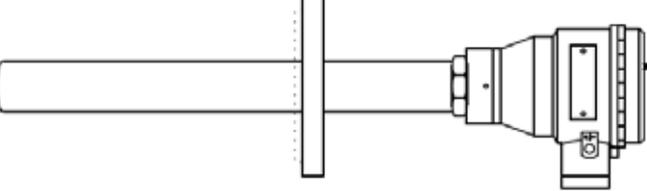
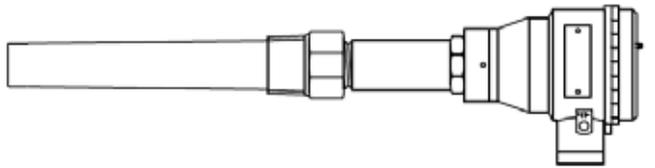
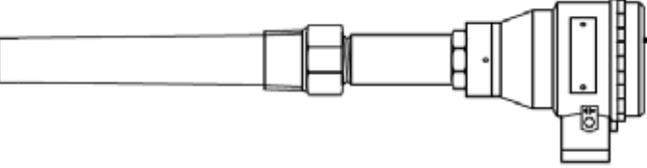
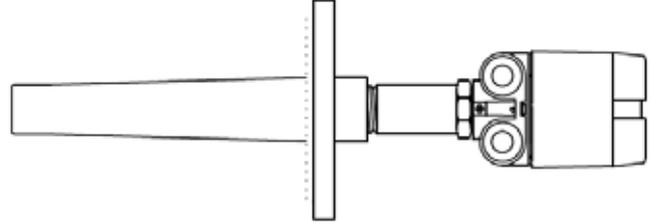
Model	Description
TF-12	TEF Tube
	
TF-22	Hastelloy C, B Protection Tube
	
TF-32	Hastelloy C, B Thermowell
	
TF-42	Ceramic Tube with Union
	
TF-52	with Temperature Transmitter
	
TF-62	Replaceable
	

List of Models

Hand-Held Surface Thermocouple Probe

Model	Type	Application	Apperance	Temperature
TCW-01	K	Magnetic Surface		250°C
TCW-02	K	Rolling Surface		250~500°C
HTC-01	K, J, T	Clamp Surface		150°C
HTC-02	K	Air/Gas		500°C
HTC-03	K	Surface		500°C
HTC-04	K	Surface		500°C
HTC-05				
HTC-06 Ø3.2	K, E, J, T, N, PT100	Food Needle		750°C
HTC-07 Ø3.2		Immersion Liquid		750°C
HTC-08 Ø4.8		Immersion Liquid		800°C
HTC-09 Ø6.4		Immersion High Temp.		1000°C
HTC-10 Ø8.0		Immersion High Temp.		1250°C
HSTC-11 Ø4.8	S-TYPE INCO600 Sheathed	Secondary Standard		100~1000°C
HSR-12 Ø6.0	PT100 1/10DIN	Secondary Standard		-50~600°C
HSE-1 Ø3.2	K	Aluminum Ingots		600°C

List of Models: Ex-Proof Thermometer

Model	Description	Model	Description
EX-11	Ex-Proof Thermometer	EX-71	Thermowell with Flange
			
EX-21	Ex-Proof with Flange	EX-81	Ex-Proof with Ceramic Tube
			
EX-31	Ex-Proof with Support Pipe	EX-91	Ex-Proof with Union/Nipple
			
EX-41	Ex-Proof with Union	EX-22	Thermowell with Union
			
EX-51	Ex-Proof with Flange	EX-32	with Temperature Transmitter
			
EX-61	Ex-Proof with Thermowell	EX-42	with Temperature Indicator
			

Explosion-proof Thermocouple / RTD

The compliance of type certificate of explosion-proof electrical equipment is based on CNS 3376 series (IEC 60079 series)  and CNS 15591 series (IEC 61241 series) .

Explosion hazard areas are divided into two types:

- Where the accumulation of explosive gas under normal use conditions may cause danger.
- Where gas or liquid leaks occur only due to operating errors or accident damages and may cause danger.



International Hazardous Location Code

System	Japan (JIS)	USA(NEC)		Europe(IEC)		EPL		Explosive gas existence time
		Gas	Dust	Gas	Dust			
0	0	Class 1	Class 2	Zone 0	Zone 20	Ga	Da	1000hrs/year
1	1	Division 1	Division 1	Zone 1	Zone 21	Gb	Db	10~1000hrs/year
2	2	Class 1 Division 2	Class 2 Division 2	Zone 2	Zone 22	Gc	Dc	1~10/year

Classification and Temperature Range of Explosive Mixtures

Class	Area	Location	Classification	Temp Range°C	International Code		
I		Coal mine electrical equipment	1.14mm/MESC		IEC	JIS	NEC
II	II A	Explosive gas Electrical equipment	0.9<MESG<1.14	>450	T1	G1	T1
	II B		0.5<MESG ≤ 0.9	300~450	T2	G2	T2
	II C		MESG ≤ 0.5	300~200	T3	G3	T3
III	III A	Explosive dust Electrical equipment	Combustible dust	135~200	T4	G4	T4
	III B		Conductive dust	100~135	T5	G5	T5
	III C		Non-conductive dust	85~100	T6	G6	T6

Explosion-proof structure classification

Mode	flameproof enclosure	increased safety	intrinsic safety	pressurized enclosure	oil immersion	powder filling
Code	d	e	i	p	o	q
Mode	encapsulation	non incensive	special type	enclosure, dust	type of protection, dust	encapsulation, dust
Code	m	n	s	tD	pD	mD

Thermoway Explosion-proof mode

Explosion-proof specification code	Explosion-proof Certified Model
Ex d II C T6 Gb X	Ex-91-S-X-T Ex-11-S-X-T
Ex d II C T6 Gb U	Ex-11-A-X-S Ex-I2-A-X-S
Ex tD A21 IP67 T85°C X	Ex-91-A-X-T Ex-22-A-X-S
Ex tD III C T85°C Db U	Ex-22-S-X-S EXP-A
Ex d II C T1~T6 Gb	ST(a)-(b)(c)-B

Thermocouple Head with Digital Indicator

- Digital temperature indicator displays temperature(°C and °F) and milliampere (for standard 4~20mA loop).
- It can be separately mounted on wall or 2" diameter pipe.
- it can be connected with thermocouple and RTD.
- Explosion-proof "Exd II C T6" certified.
- Installed with tempered glass.
- TC head can be installed with 2 pcs of temperature transmitter.
- Display with 4 digits, and with negative "-" at left on the array.
- Maximum and minimum mA value can be recorded for detecting the abnormal signals.



Explosion-proof Terminal Box: K-9

Material	Explosion-proof head	Weight	Entrance pipe thread	Exit pipe thread
Aluminum alloy	PCE-10002	850g	1/2"PF, 3/4"PF, M20, M22	

Digital Indicator: EX-I2-1

EX-I2-1 is a digital indicator for installation directly in a 4-20 mA loop without need for external power. The indicator is equipped with bright, easy-to-read LCD digits, and the scale is easily programmable without reference signal. A temperature transmitter can be integrated for direct sensor input. It can record maximum and minimum milliamps to see if there are any abnormal signals.



Technical Specification	
Type of Display	LCD
Input Current	4-20 mA
Maximum Current	23 mA
Minimum Current	3.5 mA
Loop Impedance	190 Ohms
Voltage Drop	<3.9V
Indication Range	-999 to 9999
Typical Accuracy	±0.1% ± 2 digit
Operation Temperature	-20~70°C
Storage Temperature	-20~75°C



Socket: EX-I2-B

Mounting Bracket



It can be mounted on walls or 2" diameter tubes.

Material	Weight*	Accessories
SS316	360g	2" U Bolt, Screws, Nuts, and Washers
	426g	2" U Bolt, Screws, Nuts, and Washers

*Not including accessories

Thermocouple Wire

Insulation Material Feature

Insulation	Temp Range	Incombustibility	Abrasion resistance	Oil Resistance	Acid Resistance	Humidity Resistance	Flexibility
Polyvinyl Chloride(PVC)	-20°C ~105°C	Poor	Good	Poor	Good	Good	Excellent
Silicone	-100°C ~200°C	Good	Excellent	Excellent	Excellent	Excellent	Good
Teflon(FEP)	-240°C ~205°C	Good	Excellent	Excellent	Excellent	Excellent	Good
Teflon(PFA)	-190°C ~260°C	Good	Excellent	Excellent	Excellent	Excellent	Good
Kapton	-269°C ~400°C	Good	Excellent	Good	Good	Good	Good
Glass Fiber	-73°C ~482°C	Excellent	Good	Excellent	Excellent	Poor	Good
Nextel Ceramic	-17°C ~1450°C	Excellent	Poor	Excellent	Good	Poor	Good



KAPTON



Glassfiber with
Stainless Steel Overbraid



PVC+PVC



TEF+SS +TEF



Ceramic



PVC+SS+PVC



TEF+Aluminum Foil+TEF



Glassfiber+Glassfiber



Multipair cable, PVC+Aluminum Foil
+drain wire+PVC

Conductor Size & Loop Resistance(Ω/m)

Nominal Area	Core strands/Dia.	BC	R/SC	NX	KX	EX	JX	TX
0.5 mm ²	20/0.18	0.068	0.13	2.68	1.94	2.36	1.22	1.01
0.75 mm ²	30/0.18	0.046	0.09	1.78	1.29	1.57	0.81	0.67
1.25 mm ²	7/0.45	0.028	0.054	1.07	0.77	0.94	0.49	0.40
1.3 mm ²	4/0.65	0.026	0.051	1.03	0.75	0.91	0.47	0.39
2.0 mm ²	7/0.6	0.017	0.034	0.68	0.49	0.60	0.31	0.26
2.3 mm ²	7/0.65	0.015	0.029	0.58	0.42	0.51	0.26	0.22

(JIS C1610-2012)

AWG	Diameter	Thermocouple Wire							
		BX	*CX	RX, SX	E	J	K	T	N
No.	inches								
16	0.051	0.039	0.147	0.016	0.281	0.145	0.233	0.120	0.310
18	0.040	0.063	0.238	0.025	0.453	0.234	0.376	0.194	0.500
20	0.032	0.098	0.372	0.040	0.709	0.367	0.589	0.304	0.783
22	0.025	0.156	0.592	0.063	1.129	0.584	0.937	0.483	1.245
24	0.020	0.248	0.941	0.100	1.795	0.928	1.490	0.768	1.980
26	0.016	0.395	1.495	0.159	2.853	1.476	2.369	1.221	3.148
28	0.013	0.628	2.378	0.253	4.537	2.347	3.767	1.942	5.006
30	0.010	0.999	3.781	0.402	7.214	3.731	5.990	3.088	7.960
32	0.008	1.588	6.012	0.639	11.470	5.933	9.524	4.910	12.656
34	0.006	2.525	9.560	1.016	18.239	9.434	15.145	7.808	20.126
36	0.005	4.015	15.200	1.615	29.000	15.000	24.080	12.415	32.000

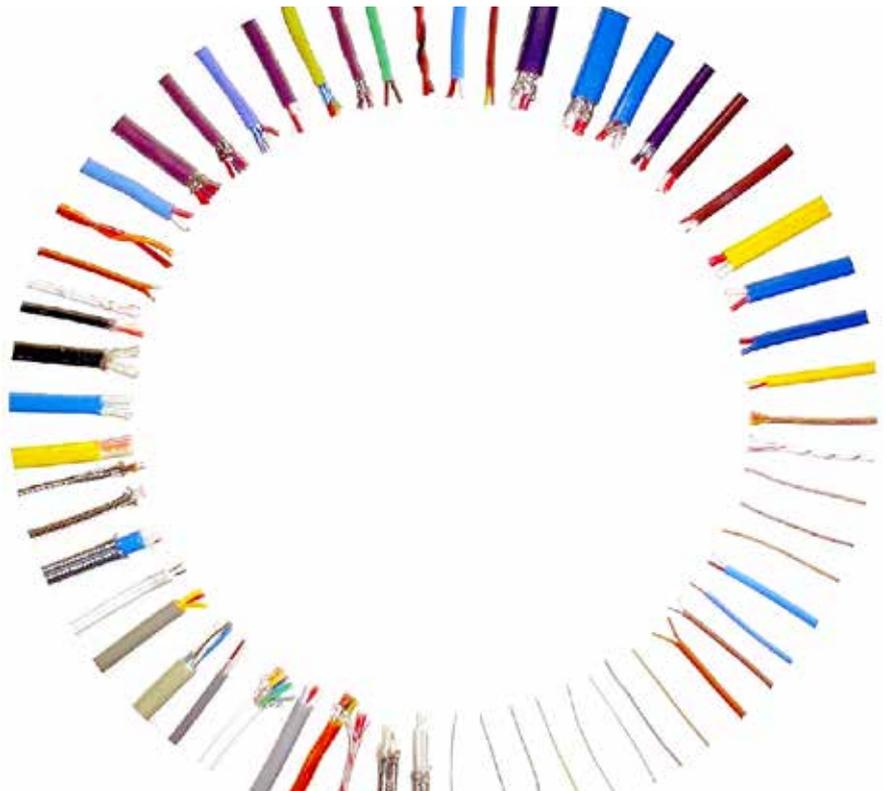
*Not official symbol or standard designation * Ω/Pft at 20°C

(ANSI MC96.1)

Thermocouple Wire

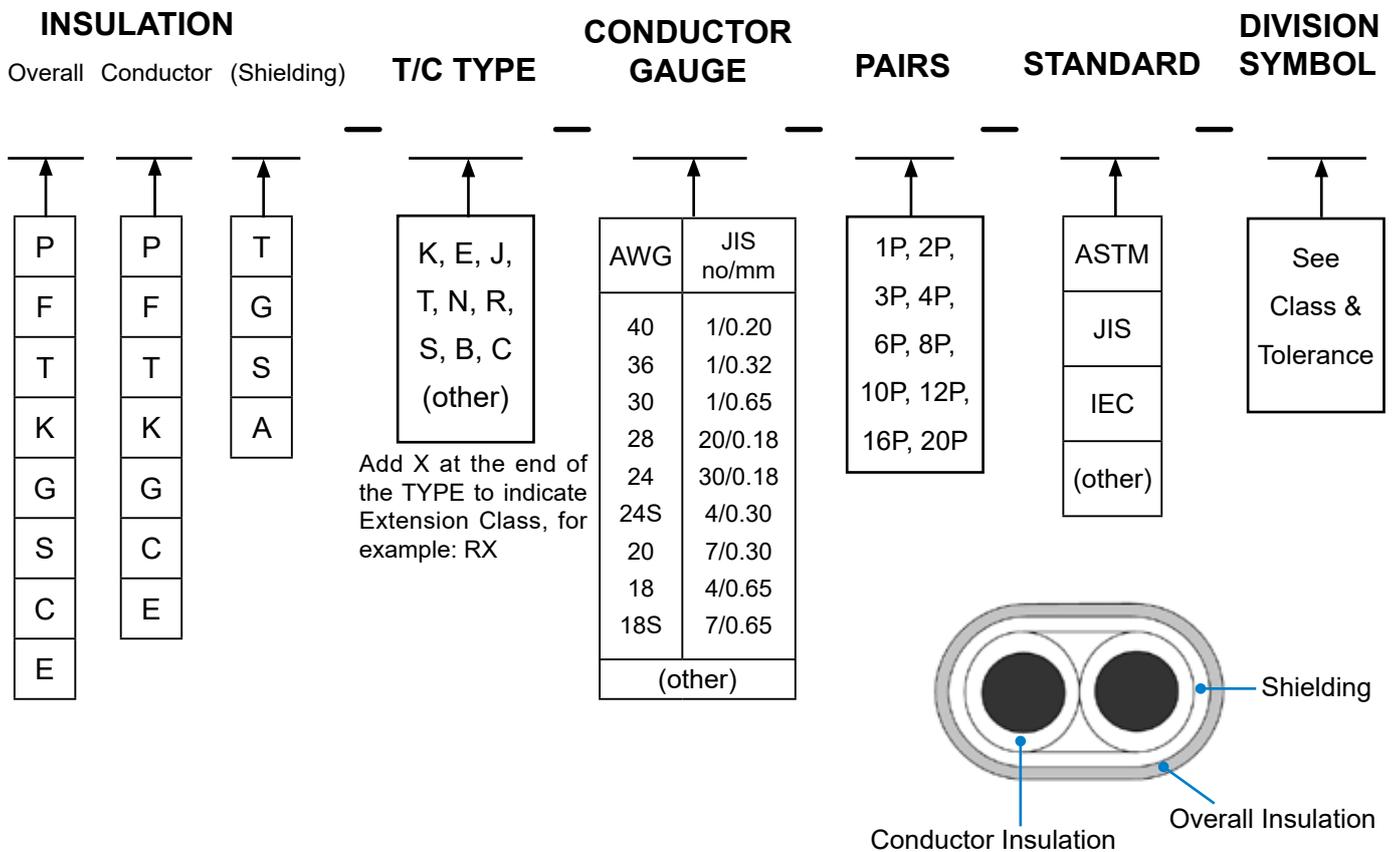
Conductor Size Table

Gage No.	AWG		SWG		Gage No.	AWG		SWG	
	mm	inch	mm	inch		mm	inch	mm	inch
0	8.25	0.3249	8.23	0.324	23	0.574	0.0226	0.610	0.024
1	7.35	0.2893	7.62	0.300	24	0.511	0.0201	0.559	0.022
2	6.54	0.2576	7.01	0.276	25	0.455	0.0179	0.508	0.020
3	5.83	0.2294	6.40	0.252	26	0.404	0.0159	0.457	0.0180
4	5.19	0.2043	5.89	0.232	27	0.361	0.0142	0.417	0.0164
5	4.62	0.1819	5.38	0.212	28	0.320	0.0126	0.376	0.0148
6	4.11	0.1620	4.88	0.192	29	0.287	0.0113	0.345	0.0136
7	3.67	0.1443	4.47	0.176	30	0.254	0.0100	0.315	0.0124
8	3.26	0.1285	4.06	0.160	31	0.226	0.0089	0.295	0.0116
9	2.91	0.1144	3.66	0.144	32	0.203	0.0080	0.274	0.0108
10	2.59	0.1019	3.25	0.128	33	0.180	0.0071	0.254	0.0100
11	2.30	0.0907	2.95	0.116	34	0.160	0.0063	0.234	0.0092
12	2.05	0.0808	2.64	0.104	35	0.142	0.0056	0.213	0.0084
13	1.83	0.0720	2.34	0.092	36	0.127	0.0050	0.193	0.0076
14	1.63	0.0641	2.03	0.080	37	0.114	0.0045	0.173	0.0068
15	1.45	0.0571	1.83	0.072	38	0.102	0.0040	0.152	0.0060
16	1.29	0.0508	1.63	0.064	39	0.089	0.0035	0.132	0.0052
17	1.15	0.0453	1.42	0.056	40	0.079	0.0031	0.122	0.0048
18	1.02	0.0403	1.22	0.048	41	0.071	0.0028	0.112	0.0044
19	0.912	0.0359	1.02	0.040	42	0.064	0.0025	0.102	0.0040
20	0.813	0.0320	0.914	0.036	43	0.056	0.0022	0.091	0.0036
21	0.724	0.0285	0.813	0.032	44	0.051	0.0020	0.081	0.0032
22	0.643	0.0253	0.711	0.028	45	0.046	0.0018	0.071	0.0028



Thermocouple Wire

Select Your Wire Model



INSULATION MATERIAL

P	F	T	K	G	S
PVC	Teflon(FEP)	Teflon(PFA)	KAPTON	Glassfiber	Glassfiber with Stainless Steel Overbraid

C	E	A
Silica	Ceramic	Alumi-Mylar Tape with a Drain Wire

CLASS & TOLERANCE

SL	ST	C1	C2
ASTM Special Limits	ASTM Standard Limits	JIS Class 1	JIS Class 2

Example:

Model: TT-K-30-1P-ASTM-SL

Overall and conductor insulation: PFA

Wire Size: 30 AWG

1 Pair

Standard: ASTM

Tolerance: Special Limits

Thermocouple Wire

Wire Color Codes

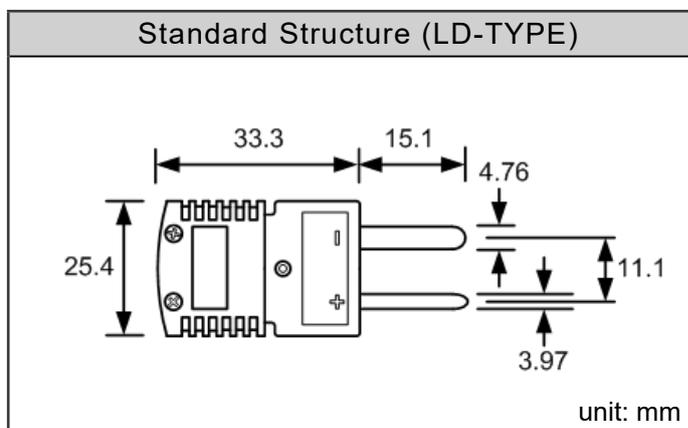
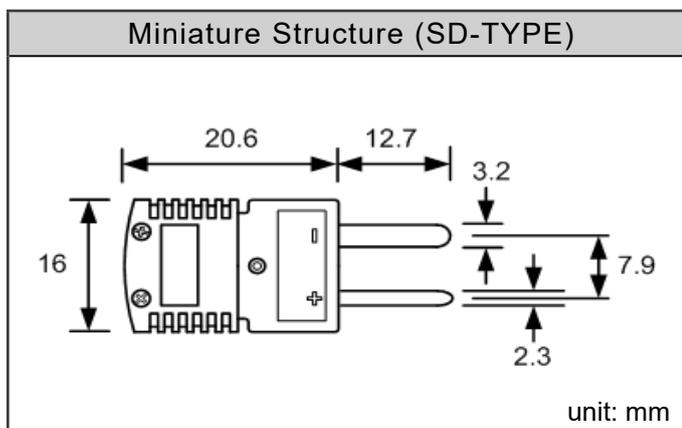
Sensor Type	ANSI/ASTM E-230 Color Code		JIS C 1610-2012 Color Code	IEC 584-3 Color Code	DIN 43710-4 Color Code	UK BS 1843 Color Code
	Thermocouple Grade	Extension Grade				
K						
E						
J						
T						
N			NONE ESTABLISHED			
R	NONE ESTABLISHED					
S	NONE ESTABLISHED					
B	NONE ESTABLISHED					NONE ESTABLISHED
C	NONE ESTABLISHED		NONE ESTABLISHED	NONE ESTABLISHED	NONE ESTABLISHED	NONE ESTABLISHED

Thermocouple Connector

Ordering Information

THERMOCOUPLE	ANSI COLOR CODE	MODEL			
		Miniature	High Temp	Standard	High Temp
K	Yellow	SD-K-JP*	HSD-K-JP	LD-K-JP	HLD-K-JP
E	Purple	SD-E-JP	HSD-E-JP	LD-E-JP	HLD-E-JP
J	Black	SD-J-JP	HSD-J-JP	LD-J-JP	HLD-J-JP
T	Blue	SD-T-JP	HSD-T-JP	LD-T-JP	HLD-T-JP
N	Orange	SD-N-JP	HSD-N-JP	LD-N-JP	HLD-N-JP
R/S	Green	SD-R-JP	HSD-R-JP	LD-R-JP	HLD-R-JP
B	White	SD-U-JP	HSD-U-JP	LD-U-JP	HLD-U-JP
C	Red	SD-C-JP	HSD-C-JP	LD-C-JP	HLD-C-JP

*J: Female connector, P: Male connector



Besides connectors, we provide vast array of connector accessories, such as cable clamp, tube clamp, jack panel.



Thermocouple Head & Terminal Block

Thermocouple Head

Model	Material	IP Markeing
KNC-A	Alloy-Aluminum	IP68 APPROVAL
KNC-B	Bakelite	IP68 APPROVAL
KNC-S	316SS/304SS	IP68 APPROVAL
KNC-I	CAST IRON	IP68 APPROVAL
KSC-A	Alloy-Aluminum	IP68 APPROVAL
KSC-B	Bakelite	IP68 APPROVAL
EXP-A	Alloy-Aluminum	IP68 / TS APPROVAL
EXP-S	316SS	IP68 / TS APPROVAL
DS	Alloy-Aluminum	IP67 APPROVAL
LT	Alloy-Aluminum	—
ST	Alloy-Aluminum	—



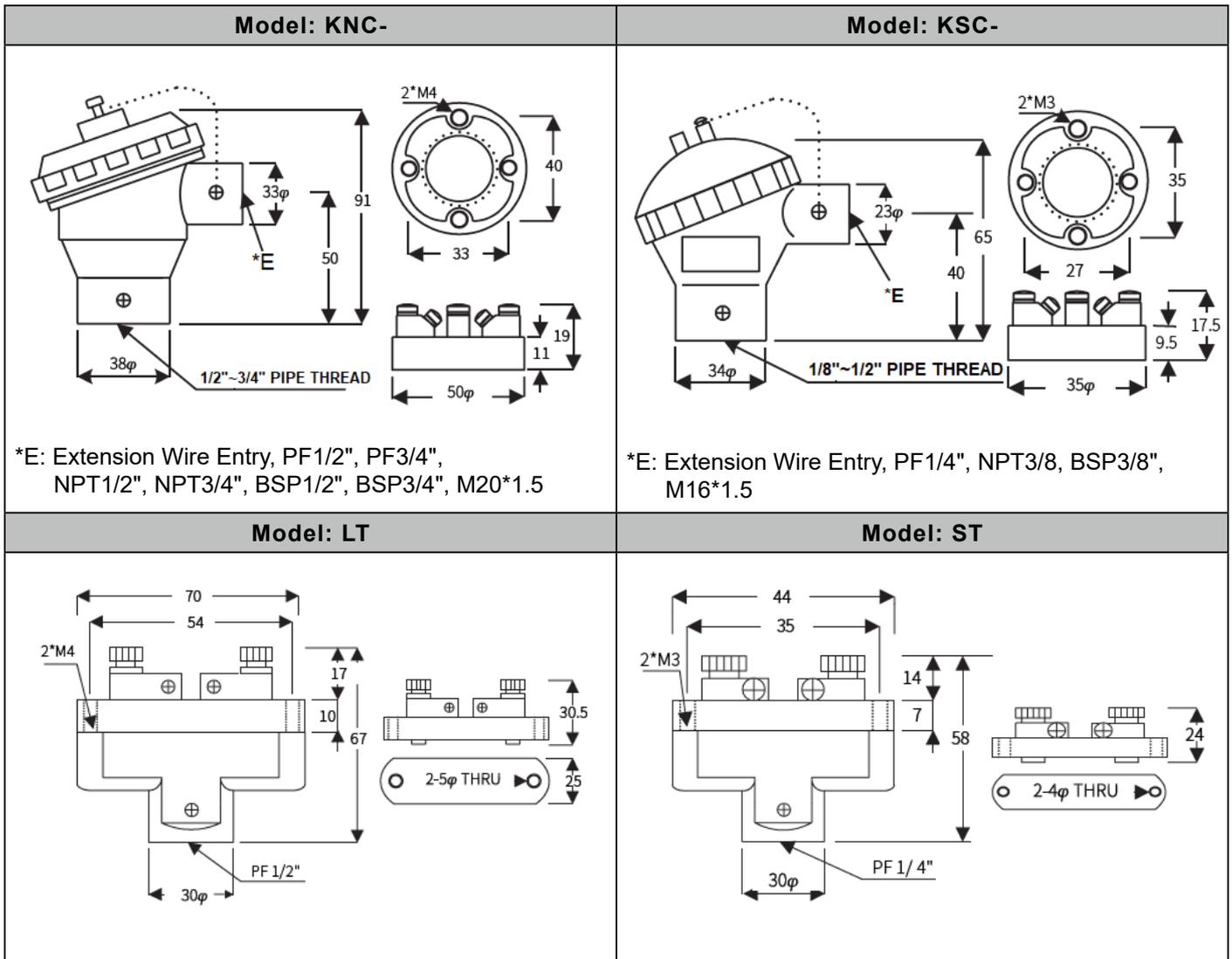
Terminal Block

Model	TC Head	Pair	Material
KNC-2PA	KNC	1P	Al ₂ O ₃
KNC-4PA	KNC	2P	Al ₂ O ₃
KNC-6PA	KNC	3P	Al ₂ O ₃
KNC-2PB	KNC	1P	Bakelite
KNC-4PB	KNC	2P	Bakelite
KNC-6PB	KNC	3P	Bakelite
KSC-2PA	KSC	1P	Al ₂ O ₃
KSC-4PA	KSC	2P	Al ₂ O ₃
KSC-6PA	KSC	3P	Al ₂ O ₃
KSC-2PB	KSC	1P	Bakelite
KSC-4PB	KSC	2P	Bakelite
KSC-6PB	KSC	3P	Bakelite



Thermocouple Head & Terminal Block

TC Head Structure



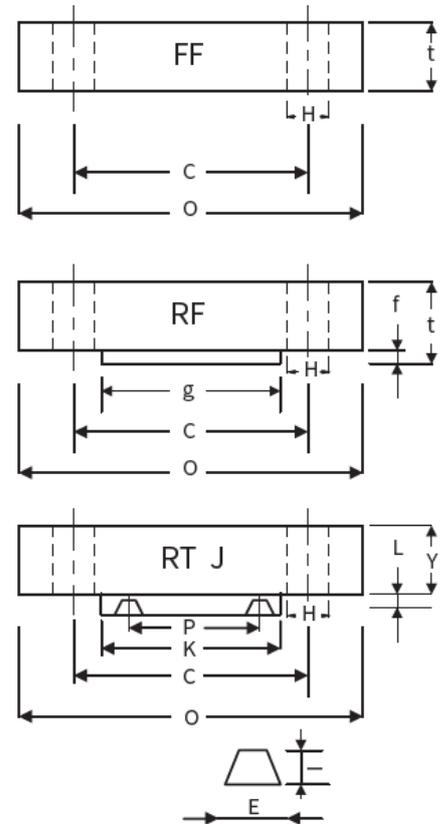
Ex-proof TC Head



Flange

JIS Flange

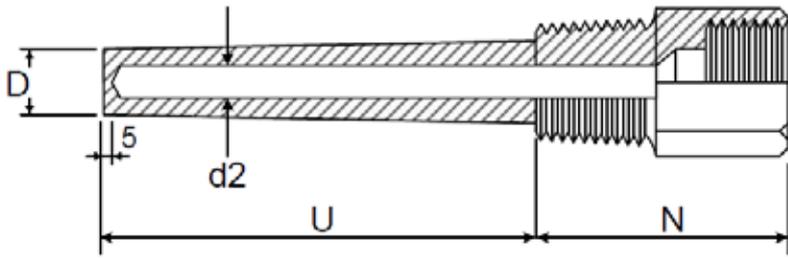
Rating	PIPE		O	C	g	t	f	Bolt Holes	
	A	B						H	N
JIS 5K	10	$\frac{3}{8}$	75	55	42	9	1	12	4
	15	$\frac{1}{2}$	80	60	48	9	1	12	4
	20	$\frac{3}{4}$	85	65	52	10	1	12	4
	25	1	95	75	78	10	1	15	4
	32	$1\frac{1}{4}$	115	90	72	12	2	15	4
	40	$1\frac{1}{2}$	120	95	78	14	2	15	4
JIS 10K	15	$\frac{1}{2}$	95	70	52	12	1	15	4
	20	$\frac{3}{4}$	100	75	58	14	1	15	4
	25	1	125	90	70	14	1	19	4
	32	$1\frac{1}{4}$	135	100	80	16	2	19	4
	40	$1\frac{1}{2}$	140	105	85	16	2	19	4
	50	2	155	120	100	16	2	19	4
JIS 20K	15	$\frac{1}{2}$	95	70	52	14	1	15	4
	20	$\frac{3}{4}$	100	75	58	16	1	15	4
	25	1	125	90	70	16	1	19	4
	32	$1\frac{1}{4}$	135	100	80	18	2	19	4
	40	$1\frac{1}{2}$	140	105	85	18	2	19	4
	50	2	155	120	100	18	2	19	8



ANSI Flange

Rating	PIPE		C	FF		RF		RTJ				Bolt Holes		
	A	B		O	t	g	f	K	P	L	I	E	H	N
ANSI 260lbs	$\frac{1}{2}$		60.5	89	11.5	35	1.6	—	—	—	—	—	15.8	4
	$\frac{3}{4}$		70	98	13	43	1.6	—	—	—	—	—	15.8	4
	1		79.5	108	14.5	51	1.6	63.5	47.6	6.4	6.4	8.7	15.8	4
	$1\frac{1}{4}$		89	117	16	64	1.6	73	57.2	6.4	6.4	8.7	15.8	4
	$\frac{1}{2}$		98.5	127	17.5	73	1.6	82.6	65.1	6.4	6.4	8.7	15.8	4
ANSI 300lbs	$\frac{1}{2}$		66.8	95	14.5	35	1.6	50.8	34.1	5.6	5.6	8.7	15.8	4
	$\frac{3}{4}$		82	117	16.5	43	1.6	63.5	42.9	6.4	6.4	8.7	19	4
	1		89	124	17.5	51	1.6	69.8	50.8	6.4	6.4	8.7	19	4
	$1\frac{1}{4}$		98.5	133	19	64	1.6	79.4	60.3	6.4	6.4	8.7	19	4
	$1\frac{1}{2}$		114.5	156	20.5	73	1.6	90.5	68.3	6.4	6.4	8.7	22.2	4
ANSI 600lbs	$\frac{1}{2}$		66.5	95	14.5	35	6.4	50.8	34.1	5.6	5.6	8.7	15.8	4
	$\frac{3}{4}$		82.5	117	16	43	6.4	63.5	42.9	6.4	6.4	8.7	19	4
	1		89	124	17.5	51	6.4	69.8	50.8	6.4	6.4	8.7	19	4
	$1\frac{1}{2}$		114.5	155.7	22.5	73	6.4	90.5	68.3	6.4	6.4	8.7	22	4
ANSI 900lbs	1		101.6	149.2	29	50.8	6.4	71.5	50.8	6.4	6.4	8.7	25	4
	$1\frac{1}{2}$		123.8	178	32	73	6.4	92.1	68.3	6.4	6.4	8.7	29	4
	2		165.1	215.9	38.1	92.1	6.4	123.8	95.3	8.0	8.0	11.9	25	8
ANSI 1200lbs	1		101.6	149.5	28.6	50.8	6.4	71.5	50.8	6.4	6.4	8.7	25	4
	$1\frac{1}{2}$		123.8	177.8	31.8	73	6.4	92.1	68.3	6.4	6.4	8.7	29	4
	2		165.1	215.9	38.1	92.1	6.4	123.8	92.3	8.0	8.0	11.9	25	8

Thermowell



Model	Description
TML01	Threaded Tapered
TML02	Threaded Straight
TML03	Threaded Weld
TML04	Weld type

Model	Description
TML05	Flange Tapered (threaded & weld)
TML06	Flange Straight (threaded & weld)
TML07	Socket Weld Tapered
TML08	Ball joint type

■ Custom thermowells available. Length up to 1700mm.

Protection Tube

Temperature and Atmosphere of Metal Protection Tube

Material	Max. Temp. °C	Melting Temp. °C	Working Environment			
304SS	900	1400	O: Oxidizing R: Reducing N: Neutral V: Vacuum			
310SS	1150	1400	O	R	N	V
316SS	930	1370	O	R	N	V
321SS	870	1398	O	R	N	V
347SS	870	1426	O	R	N	V
446SS	1090	1482	O	R	N	V
Carbon Steel	700	1370	O	N		
Inconel	1150	1398	O	N	V	
Inconel X	1200	1438	O	N	V	
Incoloy	870	1370	O	N		
HASTELLOY X	1200	1288	O			
HASTELLOY C	980	1266	O			
HASTELLOY B	760	1300	O	R		
Monel	540	1349	O	R		
Brass	340	1010	O			
Aluminum	370	649	O			
Nickel	760	1452	O			
Tantalum	2700	2996	V			
Titanium	1100	1668	V	N		
PR-10RH	1600	1850	O			

Stainless Steel Pipe dimension

Nominal Pipe Size (inch)		Outside Diameter		Wall Thickness (mm)											
				SCHL 20S			SCHL 40S			SCHL 80S			SCHL 160S		
		JIS	ASTM	Thickness		Weight	Thickness		Weight	Thickness		Weight	Thickness		Weight
DN	NPS	mm	mm	JIS (mm)	ASTM (mm)	JIS (kg/mm)	JIS (mm)	ASTM (mm)	JIS (kg/mm)	JIS (mm)	ASTM (mm)	JIS (kg/mm)	JIS (mm)	ASTM (mm)	JIS (kg/mm)
6	1/8	10.5	10.29	1.5	—	0.333	1.7	1.73	0.369	2.4	2.41	0.479	-	-	-
8	1/4	13.8	13.72	2.0	—	0.582	2.2	2.24	0.629	3.0	3.02	0.799	-	-	-
10	3/8	17.3	17.15	2.0	—	0.755	2.3	2.31	0.851	3.2	3.20	1.11	-	-	-
15	1/2	21.7	21.34	2.5	—	1.18	2.8	2.777	1.31	3.7	3.73	1.64	4.7	4.78	1.97
20	3/4	27.2	26.67	2.5	—	1.52	2.9	2.87	1.74	3.9	3.91	2.24	5.5	5.56	2.94
25	1	34	33.40	3.0	—	2.29	3.4	3.38	2.57	4.5	4.55	3.27	6.4	6.35	4.36
32	1-1/4	42.7	42.16	3.0	—	2.94	3.6	3.56	3.47	4.9	4.85	4.57	6.4	6.35	5.73
40	1-1/2	48.6	48.26	3.0	—	3.37	3.7	3.68	4.10	5.1	5.08	5.47	7.1	7.14	7.27
50	2	60.5	60.33	3.5	—	4.92	3.9	3.91	5.44	5.5	5.54	7.46	8.7	8.74	11.1
65	2-1/2	76.3	73.03	3.5	—	6.28	5.2	5.16	9.12	7.0	7.01	12.0	9.5	9.53	15.6
80	3	89.1	88.90	4.0	—	8.39	5.5	5.49	11.3	7.6	7.62	15.3	11.1	11.1	21.4
90	3-1/2	101.6	101.60	4.0	—	9.63	5.7	5.74	13.5	8.1	8.08	18.7	12.7	12.7	27.8
100	4	114.3	114.30	4.0	—	1.9	6.01	6.02	16.0	8.6	8.56	22.4	13.5	13.5	33.6
125	5	139.8	141.30	5.0	—	16.6	6.6	6.55	21.7	9.5	9.52	30.5	15.9	15.9	48.6
150	6	165.2	168.28	5.0	—	19.8	7.1	7.11	27.7	11.0	10.97	41.8	18.2	18.3	66.0
200	8	216.3	219.08	6.5	—	33.6	8.2	8.18	42.1	12.7	12.70	63.8	23.0	23.0	110
250	10	267.4	273.05	6.5	—	41.8	9.3	9.27	59.2	15.1	12.70	93.9	28.6	28.6	168
300	12	318.5	323.85	6.5	—	50.0	10.3	9.52	78.3	17.4	12.70	129	33.3	33.3	234

Protection Tube: Ceramic and SiC Tube

Alumina and SiC

Physical Properties	Unit	C799	C610	SiC(70)	SiC (Recrystallised)	SiC (Conventional)
Al ₂ O ₃ /(SiC)	%	99.7	60	70~90 (including SiC)	99 (including SiC)	90/10 (including SiC/Si)
Mineral salt	%	0.05	3.0	-	-	-
Water absorption	%	≤ 0.2	≤ 0.2	10	5	≤ 0.1
Thermal expansion	10 ⁻⁶ · K ⁻¹	8.6	6.0	5.0	3.9	3.7
Thermal conductivity	W · m ⁻¹ · K ⁻¹	26.0	2.0	28	30	90
Operating temp	°C	1700	1500	1400	1600	1350
Thermal shock	-	Great	Good	Excellent	Excellent	Excellent

Ceramic Insulator Size

unit: mm

Material	Bore	Minimum Outer Diameter	Bore Diameter	Maximum Outer Diameter	Bore Diameter	Max Length
C610	2 bores	1.2	0.2	16	4.9	3500
	4 bores	1.5	0.3	16	4.6	3500
C799	2 bores	1.1	0.3	18	4.0	3500
	4 bores	1.5	0.3	15	3.6	3500

Ceramic and SiC Tube Size

Material	C610	C799	SiC(70)	Recrystallised SiC	SiC
Mini. outer diameter x inner diameter	0.8 X 0.3	0.8 X 0.3	17 X 12	18 X 10	18 X 13
Max. outer diameter x inner diameter	30 X 23	30 X 23	50 X 25	50 X 38	45 X 35
Max. Length	3500mm	3500mm	2000mm	2100mm	2100mm
Advantage	Good gas-tightness	Good gas-tightness, abrasion resistance and corrosion resistance	Good resistance to rapid cooling and heating	Good resistance to rapid cooling and heating, corrosion and abrasion	Good resistance to rapid cooling and heating, corrosion and abrasion
Disadvantage	Poor resistance to rapid cooling and heating	Normal resistance to rapid cooling and heating	Poor gas-tightness	Poor gas-tightness	Poor gas-tightness
Max. Operating Temperature	1700	1800	1650	1650	1500

The influence of ceramic materials on platinum

Changes in EMF values after 24 hours when platinum contacts with ceramic materials at 1300°C

Material	EMF %
C610(60%Al ₂ O ₃)	+0.25
Mullite CSSR	+0.61
Al ₂ O ₃	+0.05
MgO	-0.06
Quartz	+0.70
Higt purity quartz	+0.00
95%Al ₂ O ₃	-0.06



Protection Tube: Silicon Nitride

Silicon nitride (Si_3N_4) is a chemical compound of Silicon and Nitrogen, and its synthesis was first published in 1857. Silicon nitride is a structural ceramic refractory material with high hardness and strength, especially hot-pressed sintered silicon nitride, which is one of the hardest substances in the world.

Silicon nitride has excellent thermal stability, oxidation resistance, acid and alkali resistance, and is resistant to non-ferrous metal erosion, it may be a better choice than general refractory materials and recrystallized SIC tubes.



Suitable for non-ferrous metal applications

In a wide temperature range, silicon nitride has a certain thermal conductivity, and low thermal expansion coefficient. Unlike ordinary ceramics, these properties make it excellent thermal shock resistance, making it an outstanding protective material, often used in applications requiring high durability and high temperature environments.

Technical Data

Si_3N_4 Content	≥99%
Flexural Strength	800-1000MPa
Compression Strength	>3600MPa
Thermal Conductivity	22-24W/m.k.
Porosity	<0.1
Thermal Expansion Coeff. (RT-1000°C)	$1.0 \times 10^{-6}/^\circ\text{C}$
Max. Working Temperature	1200 °C (begin to oxidize)
Hardness (HRA)	92-94
Resistivity	10^{14}

Hardness table of abrasion-resistant materials (atmospheric temperature)

Material	Hardness	Conversion value to Rockwell hardness A (HRA)
Stellite 1	HRC: 55	78.5
Stellite 6	HRC: 42	71.5
Stellite 12	HRC: 48	74.7
UMCo50	HV: 260 - 425	62.4 - 72.3
Hard chrome plating	HV: 800 - 900	83.4 - 85
Silicon nitride	HRA: 92 - 94	92 - 94

Protection Tube Size, unit: mm

16x8x300	28x16x600
16x8x400	28x16x700
16x8x500	28x16x750
16x8x600	28x16x800
16x8x700	28x16x900
16x8x750	28x16x1000
22x12x300	28x16x1100
22x12x400	28x16x1200
22x12x500	28x16x1300
22x12x600	28x16x1400
22x12x700	28x16x1500
22x12x750	25x13x660
22x12x800	30x18x660
22x12x850	35x23x660
22x12x900	40x26x660
28x16x200	40x24x480
28x16x300	50x35x660
28x16x400	60x40x660
28x16x500	ODxIDxLENGTH

Protection Tube: APMT

KANTHAL® APMT is a ferritic iron-chromium-aluminum alloy tube (FeCrAlMo Alloy) manufactured by advanced powder metallurgical technology, with high thermal conductivity, high mechanical strength, and excellent high temperature corrosion resistance, can withstand prolonged temperature up to 1250°C (2280°F).

APMT offers design engineers better options in the applications that were previously considered to be the domain of ceramic materials, and solves the problems of conventional nickel based alloys. Whether you are a furnace builder, burner manufacturer, or a user of a furnace suffering from performance limitations, or requiring heavy and regular maintenance, APMT just may be the problem solver you have been waiting for.

STRENGTH

Superior oxidation properties, sagging problem solution.

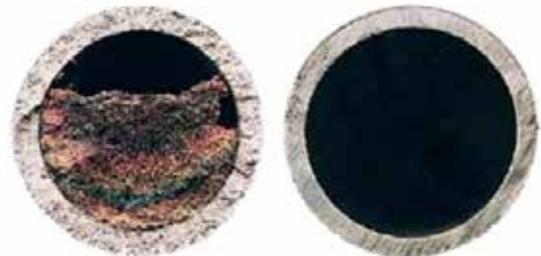
Alumina forming alloys have long been known to possess superior resistance to oxidation as compared to conventional chromia forming NiCr, and FeNiCr based alloys.

After 2300 hours of continuous use at a high temperature of 1100°C (2010°F), obviously, the NiCr tube(right) has been contaminated with oxide flakes, while APMT(left) still remains in good shape.



Clean and maintenance free in operation

The protective alumina film resists spalling during thermal cycling, thus will not contaminate products in the furnace, or cause electrical short circuits in any heating elements installed inside APMT protection tubes. APMT require no maintenance during operation, which means fewer production stoppages.



Comparison of carbon build-up in a strand annealing furnace, NiCr tube(left) and APMT(right).

Outstanding Protection tubes for thermocouples

APMT alloys have a long record of successful installation as protective tubes for thermocouples up to temperatures of 1250°C (2280°F). There are also some installations where tubes have been used up to 1400°C(2550°F), after special design considerations.

- High resistance to attack by sulphur compounds and to carburization.
- The high temperature resistance of the material makes it possible to produce tubes with thin walls with a long service life. Thin walls give rapid heat transmission, which means higher sensitivity to temperature variations.
- The aluminum oxide layer on the protection tube has a minimal tendency to spall, which means that contamination is avoided.
- No risk of short-circuiting caused by spalled oxide. In contrast to chromium oxide, aluminum oxide is not electrically conductive.



Protection Tube: Sapphire Tube

As a material for thermocouple protective casing, sapphire is multiple times more durable than conventional ceramic tubes, and in some applications it is comparable to platinum coated sheaths.

Perfect crystal lattice is the key to its high durability. Corundum ceramics consist of microscopic crystal grains sintered together. The grain boundaries create weak points in the structure where corrosion begins and ceramic components deteriorate much faster. Unlike ceramic casings, sapphire structure is perfectly homogenous throughout the whole product. Perfect crystal lattice also prevents the surface of sapphire tubes from outgassing.

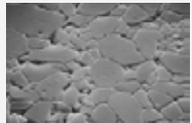


Perfect crystal lattice also prevents the surface of sapphire tubes from outgassing.

Material Characteristics

Pure Al ₂ O ₃ Single Crystal	Melting point 2053° C	Hardness – Mohs 9
High thermal conductivity	Enormous pressure resistance	High strength
Outstanding chemical resistance	100% Gas-tight	Bio compatibility

Compare with Sintered Ceramics

	Sapphire tube	VS	Ceramic tube
Structure	Single Crystal  Structure is perfectly homogenous with molecules arranged into a perfect crystal lattice throughout the whole product leaving no weak points to be attacked.		Sintered Material  Ceramic materials compose of microscopic grains. Grain boundaries represent structural weak points and source of impurity due to the residue of sintering material.
Corrosion Resistance	PERFECT!  No signs of corrosion after 2 years in the corrosive environment.		Low  Destroyed after 5 months in the same environment.
Shape Stability	PERFECT! No changes in shape until reaching the melting point.		Limited High temperatures may cause deformation.
Durability	High  After years of use in high temperature furnace, the inner still remains in good condition.		Limited  Tested in environment with lead oxide. Ceramics show PbO diffusion deep into the structure with inner casing affected.
Gas Tightness	100% Gas-Tight, high pressure resistance		Limited and dependable on manufacturer.
Temperature	Operating temperature up to 2000°C (3632°F).		Recommend to use in temperature under 1700°C (3092°F).

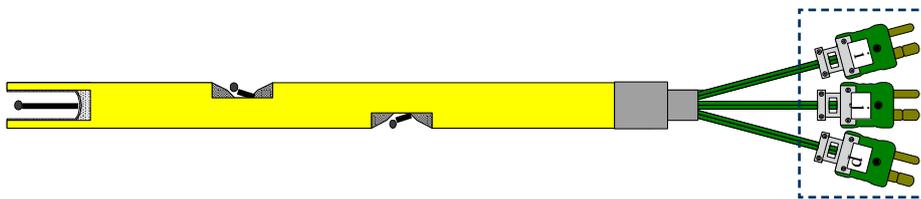
Semiconductor Application: Profile Thermocouple

Semiconductor / Solar industry production requirement

- Select high accuracy and extremely low-contamination materials
- ISO 14001 environment and high quality control
- ISO 17025 High accuracy calibration
- Select Special Limited tolerance conductor to ensure low deviation and longer life circle
- Sensor Type: R , S , B , K , PLII

Part number example:

TM05C	—	R05	—	STD	—	12/1800/HSQ	—	L/M/S	—	MINI(P)
Model Code		Sensor Type		Tolerance		Protection tube diameter/Length/ Material		Length (Effective Length)		Terminal Type



- Terminal Type
- I . Standard connector
 - II . Miniature connector
 - III . Y Terminal
 - IV . Metal connector

List of Models

Model		Model	
TM05A		TM05E	
TM05B		TM05F	
TM05C		TM05S	SPIKE THERMOCOUPLE
TM05D		TM05K	MONITOR THERMOMETER

Extreme Temperature

THERMOWAY Extreme Temperature Thermocouples are designed for use in extremely high temperatures up to 2300 °C . These probes can be used in inert, oxidizing, reducing or vacuum atmospheres. Sheath material option includes Molybdenum, Platinum/ Rhodium (Type R, S, or B), Tungsten/Rhenium (Type C or D), Tantalum, Nb-Zr alloy, Sapphire, and variety of material.

We provide custom service depending on client requests.

Extreme Temperature Application

Vacuum furnace process control	Gas furnace	High temperature oven	Reactor
--------------------------------	-------------	-----------------------	---------

Probe Conductor Material		
TYPE	Conductor Material	
	+	-
R	13%Rh +Pt	Pt
S	10%Rh + Pt	Pt
B	30%Rh + Pt	6%Rh + Pt
C	5%Re + W	26%Re + W
D	3%Re + W	25%Re + W



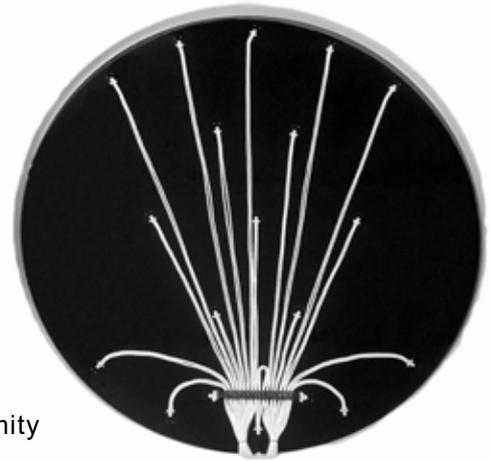
Temperature Range and Application

Sheath Material	Operating Temperature	Melting Point	Work Environment	Sheath Diameter	Minimum Bending Margin
INCONEL 600	1175°C	1345°C	Inert, Vacuum, Oxidizing	0.040", 0.062", 0.125", 0.188", 0.250"	5 X DIA
PLATINUM 10% RHODIUM	1550°C	1850°C	Inert, Oxidizing	0.040", 0.062", 0.125"	5 X DIA
TANTALUM	2200°C	2995°C	Inert, Vacuum	0.040", 0.062", 0.125"	10 X DIA
MOLYBDENUM	2000°C	2620°C	Inert, Vacuum, Reducing	0.062", 0.125", 0.188", 0.250"	Not bendable
NIOBIUM 1% ZIRCONIUM	2200°C	2495°C	Inert, Vacuum	0.062", 0.125"	10 X DIA
COATED MOLYBDENUM	1600°C	2000°C	Inert, Oxidizing	0.125", 0.250"	10 X DIA
SAPPIRE	1950°C	2000°C	Reducing, Vacuum, Inert, Oxidizing	0.125", 0.250"	Not bendable
TUNGSTEN TUBE	2550°C	3400°C	Reducing, Vacuum, Inert	0.188", 0.250"	Not bendable

Thermocouple Wafer

THERMOWAY provides TC WAFER customized service, with professional product features:

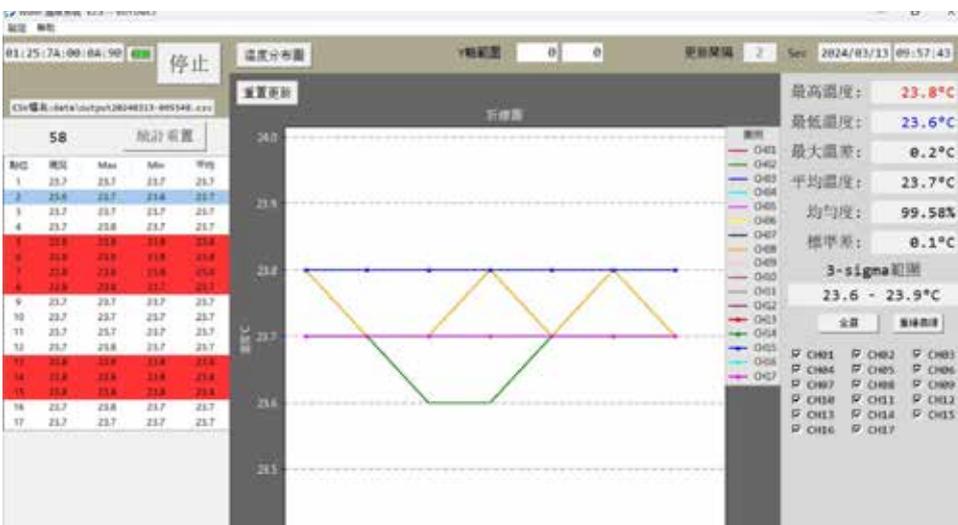
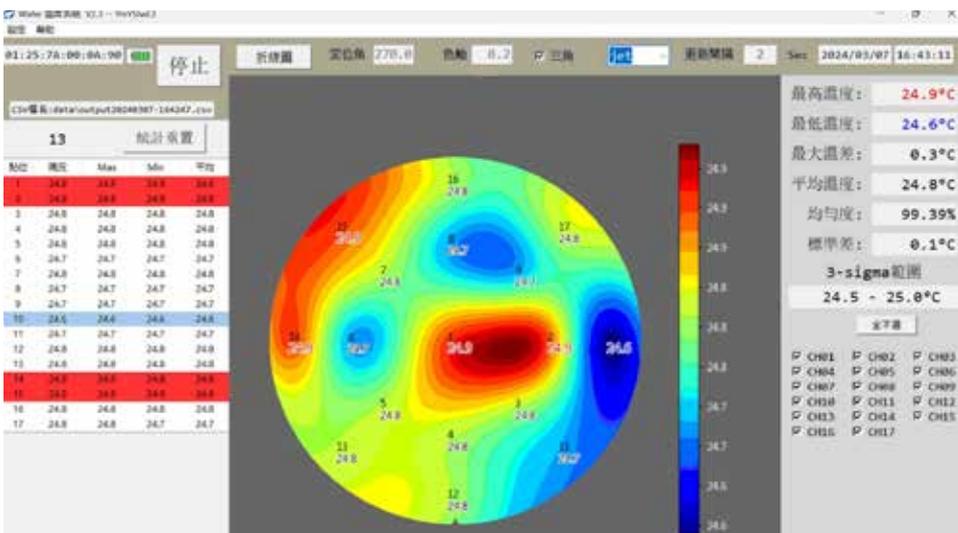
- Temperature range : 0°C~1300°C
- High-level accuracy and reusability
- Strong thermal shock resistance
- Sturdy junction
- Certified calibration report
- Calibration service and maintenance consultation



Application

- Measure the temperature stable time and temperature uniformity
- Calibrate the accuracy of temperature setting
- Assess the impact of load capacity
- Measure the temperature distribution of wafer
- Inspect the thermal stress from the center to the edge of the wafer

Software and System



Thermocouple Wafer

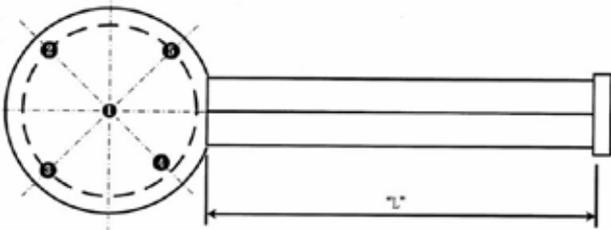
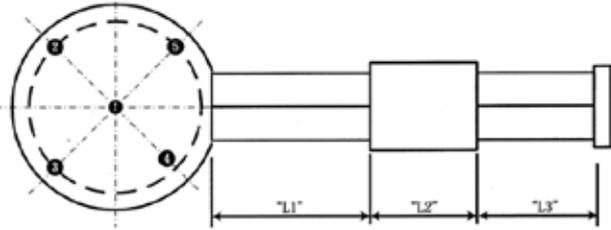
Specifications

Wafer Size	2" to 12", and customized dimension
Sensor Type	K, R, S, T, PL II
Insulation Material	PFA, Teflon, Glass fiber, Quartz Micro Tube

Operating Temperature

Type	Diameter	Working Temperature	Accuracy
R, S	0.127mm	1200°C	±0.6°C or 0.1%
	0.254mm	1300°C	±0.6°C or 0.1%
K	0.127mm	700°C	±1.1 or 0.4%
	0.254mm	700°C	±1.1 or 0.4%
T	0.127mm	400°C	±0.5 or 0.1%
	0.254mm	400°C	±0.5 or 0.1%
PL II	0.254mm	1200°C	±1.1 or 0.4%

Choose Your TC Wafer

MODEL: SX-41	MODEL: SX-51
	
<ol style="list-style-type: none"> 1. Wafer size (specify from 2" to 12") 2. Working Temperature Range 3. Thermocouple Type (choose K, R, S, T, PL II) 4. Number of Measuring Points 5. Length of L 6. Thermocouple Wire Diameter 7. Insulation Material 8. Connector Type (choose from Mini, U-Shape or D-Sub) 9. Calibration Requirement 	<ol style="list-style-type: none"> 1. Wafer size (specify from 2" to 12") 2. Working Temperature Range 3. Thermocouple Type (choose K, R, S, T, PL II) 4. Number of Measuring Points 5. Length of L1 and L3 6. Thermocouple Wire Diameter 7. Insulation for L1, L3 8. Feed Through Length, L2 9. Connector Type 10. Calibration Requirement

Reference Standard

Reference Standard

Type of Element	Tolerance 0~1100°C	Tolerance 1000~1200°C	Stability 0~1100°C	Conductor Diameter	Insulation (Material/Diameter)
R	±1.0	±1.2	±0.2	0.5mm	High Purity Alumina/4mm
S	±1.0	±1.2	±0.2	0.5mm	High Purity Alumina/4mm

Primary Standard

Type of Element	Tolerance 0~1100°C	Tolerance 1000~1550°C	Stability 0~1550°C	Conductor Diameter	Insulation (Material/Diameter)
R	±1.0	±0.15%	±0.5	0.5mm	High Purity Alumina/8mm
S	±1.0	±0.15%	±0.5	0.5mm	High Purity Alumina/8mm

Secondary Standard

Type of Element	Tolerance	Stability 0~600°C	Operating Temperature	Insulation (Material/Diameter)
SS	±1.5°C or 0.25%	±0.2	1150°C	INCO600 / 3.2mm
SK、SN	±1.1°C or 0.4%	±0.2	1250°C	SUPER230 / 6.4mm
PTR100Ω	±0.1°C or 0.2%	±0.2	600°C	INCO600 / 4.8mm

Dual Input Thermometer

	Type of Element	Temperature Range	Tolerance
	K / E / J / T TYPE	-50°C to 1372°C	±(0.05% rdg + 0.3°C)
	N TYPE	-50°C to 0°C	±(0.05% rdg + 0.8°C)
		0°C to 1300°C	±(0.05% rdg + 0.4°C)
R / S TYPE	0°C to 1767°C	±(0.05% rdg + 2°C)	

	Type of Element	Temperature Range	Tolerance
	Pt385 (100Ω)	-200°C to 800°C	±(0.05%rdg + 0.2°C) on °C scale
Pt3916 Pt3926(100Ω)	-200°C to 630°C	±(0.05%rdg + 0.4°F) on °F scale	

Fine Gage Sheathed Thermocouple

MI Sheath Thermocouple has excellent insulation quality, high resistance to pressure, and outstanding flexibility. You can see more information at page16.

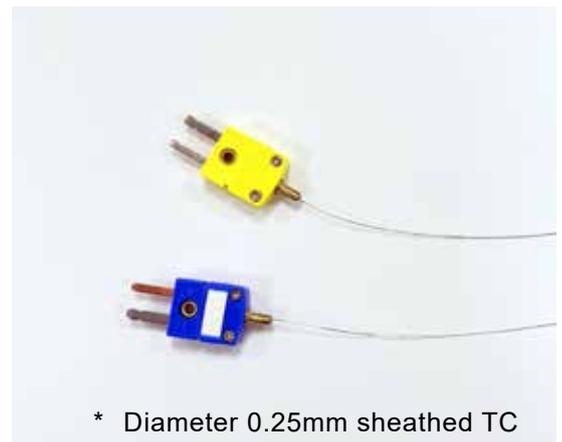
Compared with general-purpose thermocouples, MI Sheath Thermocouples have many advantages:

- **Quick Response:** The small sheath diameter, which also has small heat capacity, is highly sensitive to temperature changes, providing a very fast response time.
- **High Flexibility:** MI Sheath thermocouple can be easily installed owing to its high mechanical strength and elasticity up to bending 2 times of the sheath O.D.
- **Long Service Life:** Despite much smaller overall diameter and light weight, MI Sheath thermocouple has remarkably longer service life compared to conventional thermocouple.
- **High Mechanical Strength and Pressure Resistance:** The composite structure is resistant to extremely high vibration levels, and by choosing appropriate sheath material, it is reliable to use in corrosive atmospheres and abnormally high or low temperatures. Though it has small diameter, it can withstand about 350Mpa at a temperature of 650°C .



THERMOWAY provides customized Fine Gage Sheath Thermocouple:

- Minimum diameter of MI Cable: 0.25mm
- Metal Sheath Material: SS304, SS310S, SS316L, INCONEL 600
- Junction Type: Grounded, Ungrounded, Exposed
- With ANSI color-coded miniature connector
- Customize thermocouple probes and assemblies



* Diameter 0.25mm sheathed TC

Standard Specification

Type of Element	K, E, J, T, N, R, S, C
Sheath Diameter (mm)	0.25, 0.5, 1.0, 1.6, 2.0, 2.3, 3.2, 4.8, 6.4, 8.0 (Customizable)
Sheath Material	SS304, SS310S, SS316L, INCONEL 600
Hot Junction	Grounded, Ungrounded, Exposed
Temperature Range	-200°C - 2200°C (Depending on type of element)



* Different diameter and type sheathed thermocouples

Surface Temperature

Roller-surface Probe

Roller-surface Probes are ideal for measuring smooth and rotating surfaces, such as smooth plastics, metal pipes, textiles, and so forth. This product can also be used on moving surfaces, such as conveyor belts, roller shafts, printer rollers and other process applications.



Features

- Upright handle design, easy operation
- Fast reaction time
- Excellent insulation
- Available in type K Calibration
- Customized Product
- Operating temper : 200°C ~450°C(Depending on selected material)

Surface Probe for Aluminum Ingot

This type K thermocouple probe is designed for measuring the temperature of aluminum alloy. The double tips are elastic to be pressed, which are suitable for uneven surfaces.

- K-Type thermocouple
- Spring loaded flexible tips
- Response time: 1 second, (T90)room temperature ~ 600°C
- Customized Product
- Material: Stainless Steel, Aluminum, but copper is prohibited.



Super fast response

Set up	600°C
Surface temp	545.5°C
Room temperature	25.5°C
Heating Ratio	$(\text{Measured Temp.} - 25.5^\circ\text{C}) / (545.5^\circ\text{C} - 25.5^\circ\text{C})$

Time	Temperature	Heating Ratio
1 second	490°C	89.3%
8 second	513°C	93.8%
15 second	518°C	94.7%
60 second	523°C	95.7%

Surface Temperature

Adhesive Pad Sensor

THERMOWAY's Adhesive Pad Sensors are designed for surface temperature measurement, ideal for both flat and curved surface, and have a wide range of applications.



Features

- Silicone rubber pad provides outstanding flexibility
- Fast reaction time: Sensor element was inserted in self-adhesive pad
- Temperature range: -50 to 250°C
- Sensor type: Type K, E, J, T, and RTD PT100
- ANSI & IEC color codes available

Ultra-thin Surface Thermocouple

THERMOWAY's Ultra-thin Surface Thermocouple is made from 0.13mm alloy, the thermocouple junction is very thin and flat.

The extremely low inertia construction is ideal for measuring flat and curved metal, plastic and ceramic surfaces that require very fast response. Special limits materials are selected to produce high-precision thermocouples.

- Ultra-fast response time in milliseconds
- Ultra-thin thermocouple
- Very low thermal inertia
- Sensor type: K, E, T
- Temperature range: 0 to 260°C



Super fine, super fast

Infrared Thermometer

SONEL DIT-200 is a portable infrared thermometer gun, ideal for on-site and non-contact temperature measurement. It is easy to operate and has high accuracy. The advanced laser pointer precisely indicates the measurement area.

Applications: Temperature measurement of transformers; temperature control of busbars and connections; monitoring the condition of heating and cooling devices; temperature control of materials in metallurgical processes; checking the heating of rollers and bearings in transport conveyors, and many others.



Features

- Temperature measurements in the range of -50°C...1000°C
- Operation with an external temperature probe - temperature measurement range -50°C...1370°C
- D:S ratio of 20:1
- Circular laser pointer (marking the measurement area)

SONEL DIT-500 is a portable infrared pyrometer, suitable for high temperature measurement. With one-hand operation, it provides precise measurement of object surface temperature. 100 sets of memory can be used to store test data and can be transferred to a computer.



Features

- Rapid reaction to temperature changes (below 150 ms)
- Double laser sight (determination of the measurement area)
- Data memory (LOG) for 100 measurements
- Transmission of current readings to computer via USB cable
- Backlit display for easy readings even in dark areas

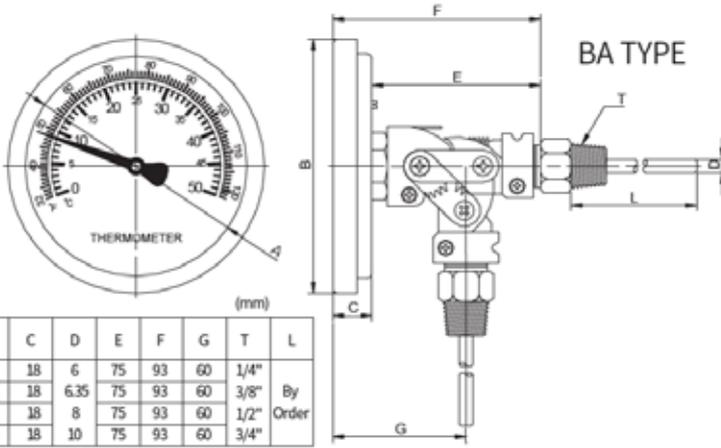
Technical Specifications

Model	DIT-200	DIT-500
Infrared temperature range	-50 to 1000°C	-50 to 1600°C
Accuracy for infrared temperature	±3.5°C (-50 to 20°C) ±(1.0% m.v. + 1°C)(20 to 300°C) ±1.5% m.v. (300 to 1000°C)	±2.5°C (-50 to 20°C) ±(1.0% m.v. + 1°C)(20 to 400°C) ±(1.5% m.v. + 2°C)(400 to 800°C) ±2.5% m.v. (800 to 1600°C)
Temperature range for K probe	-50 to 1370°C	-
Accuracy for K probe	±2°C (-50 to 0°C) ±(0.5% m.v. + 1.5°C)(0 to 1370°C)	
Resolution	0.1°C	0.1°C
D:S (Distance-to-spot ratio)	20:1	50:1
LCD display	segmented, with backlight	segmented, with backlight
Spectral sensitivity	8~14 μm	8~14 μm
Emissivity	digitally adjusted from 0.10 to 1.00	digitally adjusted from 0.10 to 1.00
Response time	150 ms	150 ms
Power supply	2x AAA 1.5 V battery	9 V alkaline battery NEDA 1604A or IEC 6LR61
Weight	242 g	350 g
Dimensions	170 x 50 x 95 mm	230 x 155 x 54 mm

BI-METAL Dial Thermometer

Specification

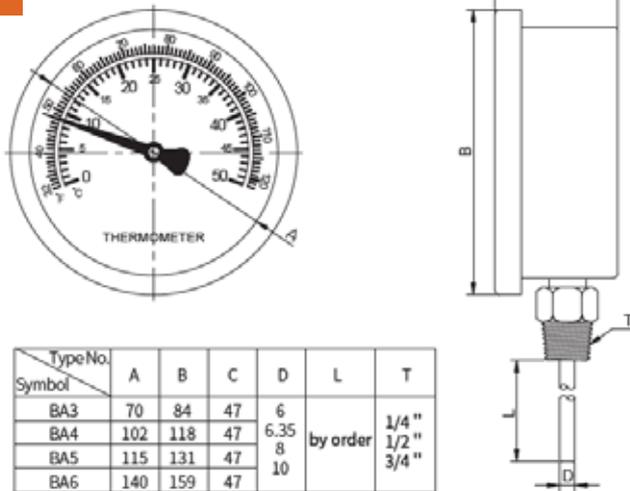
BA Type



Type No. Symbol	A	B	C	D	E	F	G	T	L
BA3	70	84	18	6	75	93	60	1/4"	By Order
BA4	102	119	18	6.35	75	93	60	3/8"	
BA5	115	131	18	8	75	93	60	1/2"	
BA6	140	159	18	10	75	93	60	3/4"	



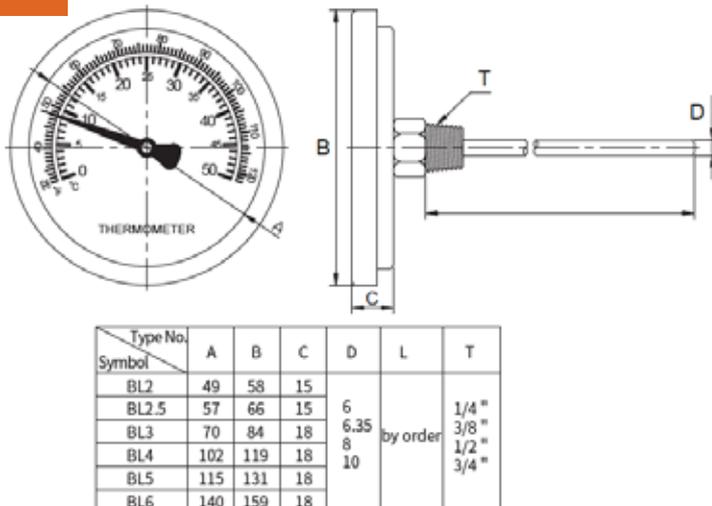
BS Type



Type No. Symbol	A	B	C	D	L	T
BA3	70	84	47	6	by order	1/4"
BA4	102	118	47	6.35		1/2"
BA5	115	131	47	8		3/4"
BA6	140	159	47	10		



BL Type



Type No. Symbol	A	B	C	D	L	T
BL2	49	58	15	6 6.35 8 10	by order	1/4"
BL2.5	57	66	15			3/8"
BL3	70	84	18			1/2"
BL4	102	119	18			3/4"
BL5	115	131	18			
BL6	140	159	18			

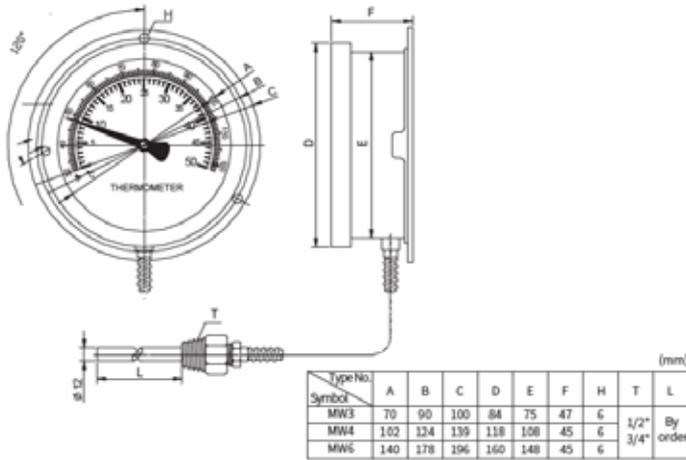


LIQUID-FILLED Thermometer

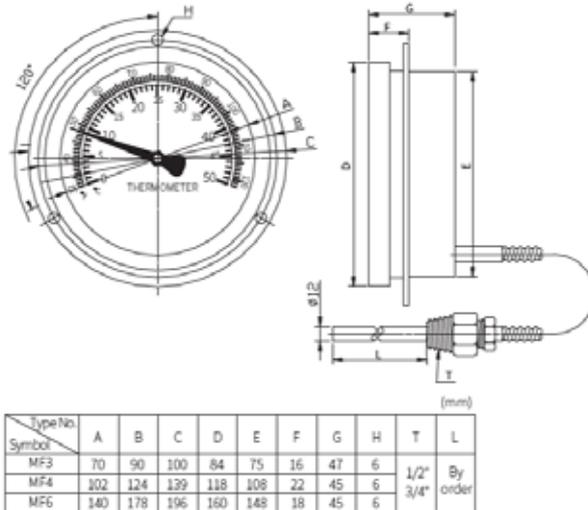
LIQUID-FILLED Thermometer Remote Reading

Specification

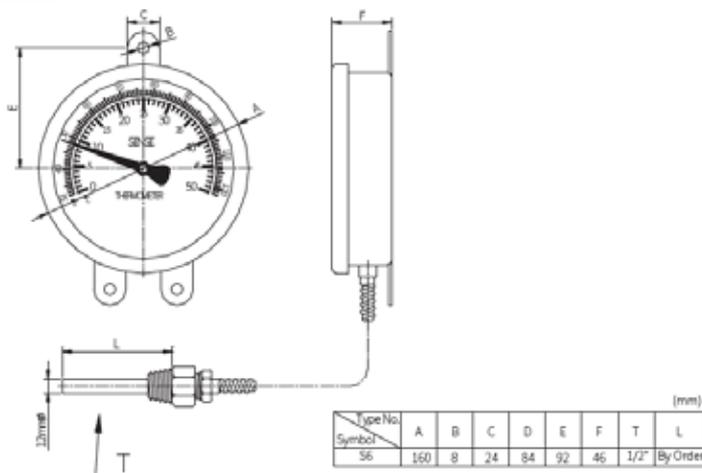
MW Type



MF Type

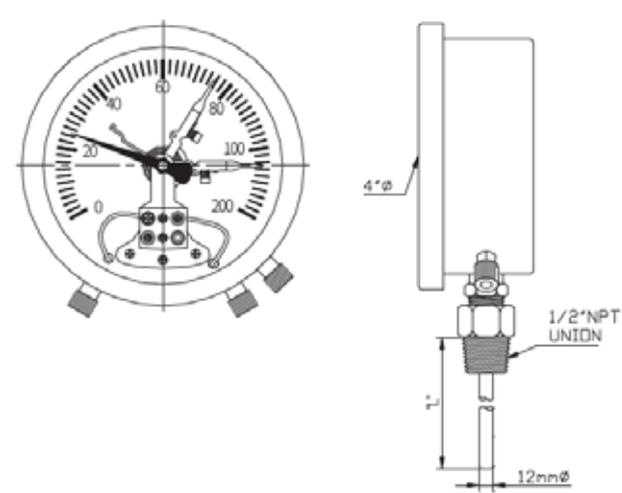
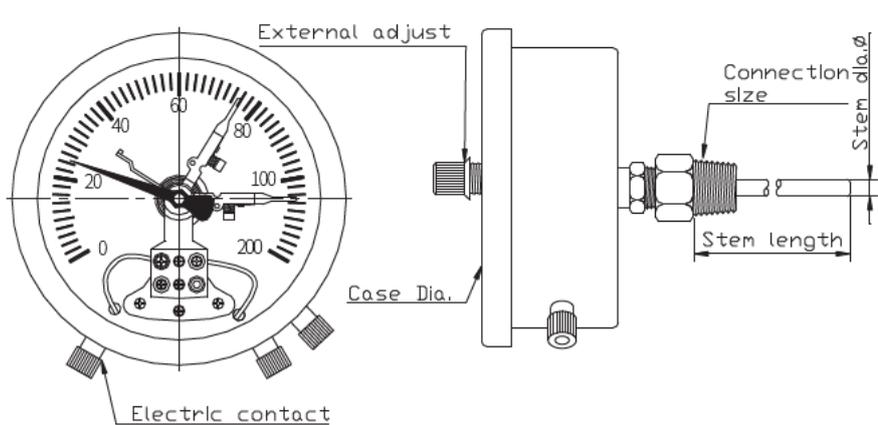
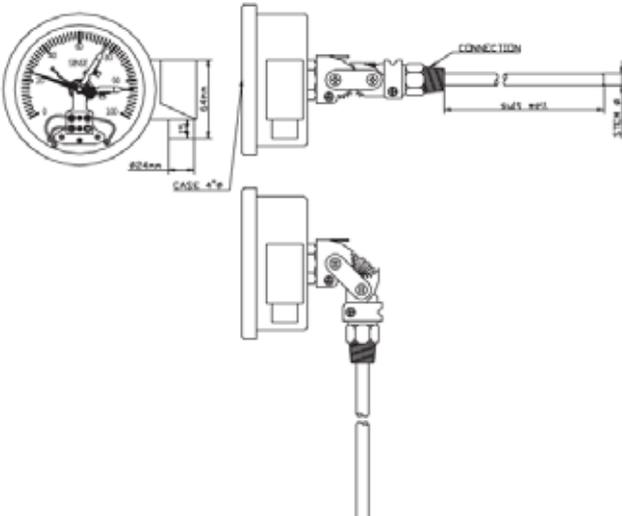


S6 Type



LIQUID-FILLED Thermometer

LIQUID-FILLED Thermometer with Contact

Specification	
<p>HS1A1B Type</p> 	
<p>HT1A1B Type</p> 	
<p>HA1A1B Type</p> 	

INOR Temperature Transmitter

INOR

Specialists in industrial temperature measurement

INOR was founded in 1939, and with ample experience of industrial temperature measurement, INOR possesses an incomparable level of expertise. In 1974, INOR introduced the world's first headmounted temperature transmitters, which was the start of a new era in industrial temperature measurement. Today, INOR is one of the world's leading manufacturers of signal conditioners with focus on temperature transmitters.

As the leader of temperature transmitter developers, INOR provides outstanding products with a complete range of applications. ATEX and SIL2 certified transmitters with HART and NFC communications are your wonderful solution.



APAQ C130^{RTD}

Digital 2-wire transmitter for Pt100 and Pt1000 with wireless communication

- Type: Digital
- Input: RTD
- Output: 4-20 mA
- Isolation: Unisolated
- Measuring channels: 1 channel



APAQ C130^{TC}

Digital 2-wire transmitter for thermocouple with wireless communication

- Type: Digital
- Input: TC
- Output: 4-20 mA
- Isolation: Unisolated
- Measuring channels: 1 channel



APAQ R130^{RTD}

Digital 2-wire transmitter for Pt100 and Pt1000 with wireless communication

- Type: Digital
- Input: RTD
- Output: 4-20 mA
- Isolation: Unisolated
- Measuring channels: 1 channel



APAQ R130^{TC}

Digital 2-wire transmitter for thermocouple with wireless communication

- Type: Digital
- Input: TC
- Output: 4-20 mA
- Isolation: Unisolated
- Measuring channels: 1 channel



IPAQ R460

6 mm transmitter for resistance thermometers and thermocouples

- Type: Digital
- Input: RTD, TC, mV, Ohm and KTY
- Output: 4-20 mA, 0-10 V
- Isolation: Isolated
- Measuring channels: 1 channel



OEM202P

Digital transmitter to be built into own equipment

- Type: Digital
- Input: RTD
- Output: 4-20 mA
- Isolation: Unisolated
- Measuring channels: 1 channel

INOR Temperature Transmitter



OEM202R

Digital transmitter to be built into own equipment

- Type: Digital
- Input: RTD
- Output: 4-20 mA
- Isolation: Unisolated
- Measuring channels: 1 channel



OEM202W

Digital transmitter to be built into own equipment

- Type: Digital
- Input: RTD
- Output: 4-20 mA
- Isolation: Unisolated
- Measuring channels: 1 channel



IPAQ-C310^{RTD}

Programmable 2-wire transmitter for RTD and resistance inputs

- Type: Digital
- Input: RTD
- Output: 4-20 mA
- Isolation: Isolated
- Measuring channels: 1 channel



MinIPAQ-L

Basic Programmable 2-wire Transmitter

- Type: Digital
- Input: RTD, thermocouple
- Output: 4-20 mA
- Isolation: Unisolated
- Measuring channels: 1 channel



IPAQ C202

Programmable 2-wire Transmitter dedicated for Pt100 sensors

- Type: Digital
- Input: RTD
- Output: 4-20 mA
- Isolation: Unisolated
- Measuring channels: 1 channel



IPAQ C330

Universal 2-wire transmitter with wireless communication

- Type: Digital
- Input: RTD, thermocouple, Universal
- Output: 4-20 mA
- Isolation: Isolated
- Measuring channels: 1 channel



IPAQ R330

Universal Programmable 2-wire Transmitters

- Type: Digital
- Input: RTD, thermocouple, Universal
- Output: 4-20 mA
- Isolation: Isolated
- Measuring channels: 1 channel



IPAQ C520

HART Compatible Universal Dual-input 2-wire Transmitters

- Type: Digital
- Input: RTD, thermocouple, Universal
- Output: 4-20 mA, HART®
- Isolation: Isolated
- Measuring channels: 2 channels



IPAQ R520

HART Compatible Universal Dual-input 2-wire Transmitters

- Type: Digital
- Input: RTD, thermocouple, Universal
- Output: 4-20 mA, HART®
- Isolation: Isolated
- Measuring channels: 2 channels



INOR Temperature Transmitter



IPAQ C530

Universal HART-compatible 2-wire transmitter with NFC

- Type: Digital
- Input: RTD, thermocouple, Universal
- Output: 4-20 mA, HART-protocol
- Isolation: Isolated
- Measuring channels: 1 channel



IPAQ R530

Universal HART-compatible 2-wire transmitter with NFC

- Type: Digital
- Input: RTD, thermocouple, Universal
- Output: 4-20 mA, HART-protocol
- Isolation: Isolated
- Measuring channels: 1 channel



MinIPAQ-HLP

Basic Programmable 2-wire Transmitter

- Type: Digital
- Input: RTD thermocouple
- Output: 4-20 mA
- Isolation: Unisolated
- Measuring channels: 1 channel

Your professional and dependable partner

THERMOWAY provides professional product consultation and technical support; we also provide corresponding accessories and equipments for transmitters to meet the complete needs of clients.

LCD-W110

Loop Powered LCD Indicators with backlight for Field Mounting



LCD-W110 is a digital indicator with backlight for installation directly in a 4-20 mA loop without need for external power. The backlight makes it easy-to-read and LCD-W110 comes with a high-contrast LCD display.

LCD-W110 is designed for field mounting on wall, pipe or DIN rail and has a rugged and splash proof housing.

The scale is easily programmable with push buttons or APP via NFC communication using INOR Connect.

A temperature transmitter can be integrated for direct sensor input.

INOR Temperature Transmitter

Model	Input Signal	Output Signal	Power Supply	Accuracy
APAQ C130 ^{TC} APAQ R130 ^{TC} APAQ C130 ^{RTD} APAQ R130 ^{RTD}	T/C TYPE B, E, J, K, N, R, S and T Pt100, Pt1000 2-wire connection	4-20 mA	6 to 32 VDC	Type E, J, K, N: ± 1 K or $\pm 0,2$ % of span Type B, R, S, T: ± 2 K or $\pm 0,2$ % of span Max. $\pm 0,15$ K or $\pm 0,15$ % of span
IPAQ C310 ^{RTD}	RTD Pt100, Pt10 ... Pt1000, Ni100, Ni120, Ni1000 Resistance 0 to 10000 Ω	4-20 mA	8 to 36 VDC	Max. of ± 0.1 °C or ± 0.1 % of span
IPAQ C202	RTD Pt100 in 3-wire connection	4-20 mA	6 to 32 VDC	Max. ± 0.1 K or $\pm 0,1$ % of span
IPAQ C330 IPAQ R330	RTD Pt100, Pt1000, Ni100, Ni120, Ni1000, Cu10 T/C TYPE B, R, S, C, K, E, J, T, N, D	4-20 mA	8 to 36 VDC 8 to 30 VDC	± 0.08 %
IPAQ C520 IPAQ R520	RTD Pt10, Pt50, Pt100, Pt200, Pt500, Pt1000, Ni100, Ni120, Ni1000, Cu10 T/C TYPE B, R, S, C, K, E, J, T, N, D	4-20 mA HART®	10 to 36 VDC 10 to 30 VDC	Max. of ± 0.1 °C or ± 0.05 %
IPAQ C530 IPAQ R530	RTD Pt100, Pt1000, Ni100, Ni120, Ni1000, Cu10 T/C TYPE B, R, S, C, K, E, J, T, N, D	4-20 mA HART®	8.5 to 36 VDC 8.5 to 30 VDC	Max. ± 0.08 K or ± 0.08 %
MinIPAQ-HLP MinIPAQ-L	RTD Pt100, Pt1000, Ni100, Ni120, Ni1000, Cu10 T/C TYPE B, R, S, C, K, E, J, T, N, L, U	4-20 mA	8 to 32 VDC	± 0.15 %
IPAQ R460	RTD Pt100, Pt200, Pt500, Pt1000, Ni100, Ni120, Ni500, Ni1000 T/C TYPE B, R, S, C, K, E, J, T, N, U, L	0-20 mA, 4-20 mA, 0-10 mA, 2-10 mA	24 VDC	Max. ± 0.05 K or ± 0.05 % of measuring range
OEM202P OEM202R OEN202W	RTD Pt100, Pt1000	4-20 mA	5 to 32 VDC	Max. of ± 0.1 °C or ± 0.1 % of span

Calibration Service

THERMOWAY's Calibration Laboratory was built to meet the calibration requirements of our clients. Over the past 30 years, our laboratory has continuously accumulated experiences, improved its capabilities, and continued to expand the scope of calibration service.

- We provide fast-service, high-quality, and formal certificate
- National calibrational laboratory standard traceable: NIST , JEMIC , NML
- Our lab is ISO9001 , ISO1400 , 1ISO/IEC 17025 compliant
- All calibration services are performed by professionally trained technicians

THERMOWAY provides calibration certificate:



Taiwan Accreditation Foundation
Certification No: 3416



IECQ Certificate of Approval
Independent Testing Laboratory
Certification No: IECQ-L ULTW 09.0013



International Laboratory Accreditation Cooperation
Mutual Recognition Arrangement

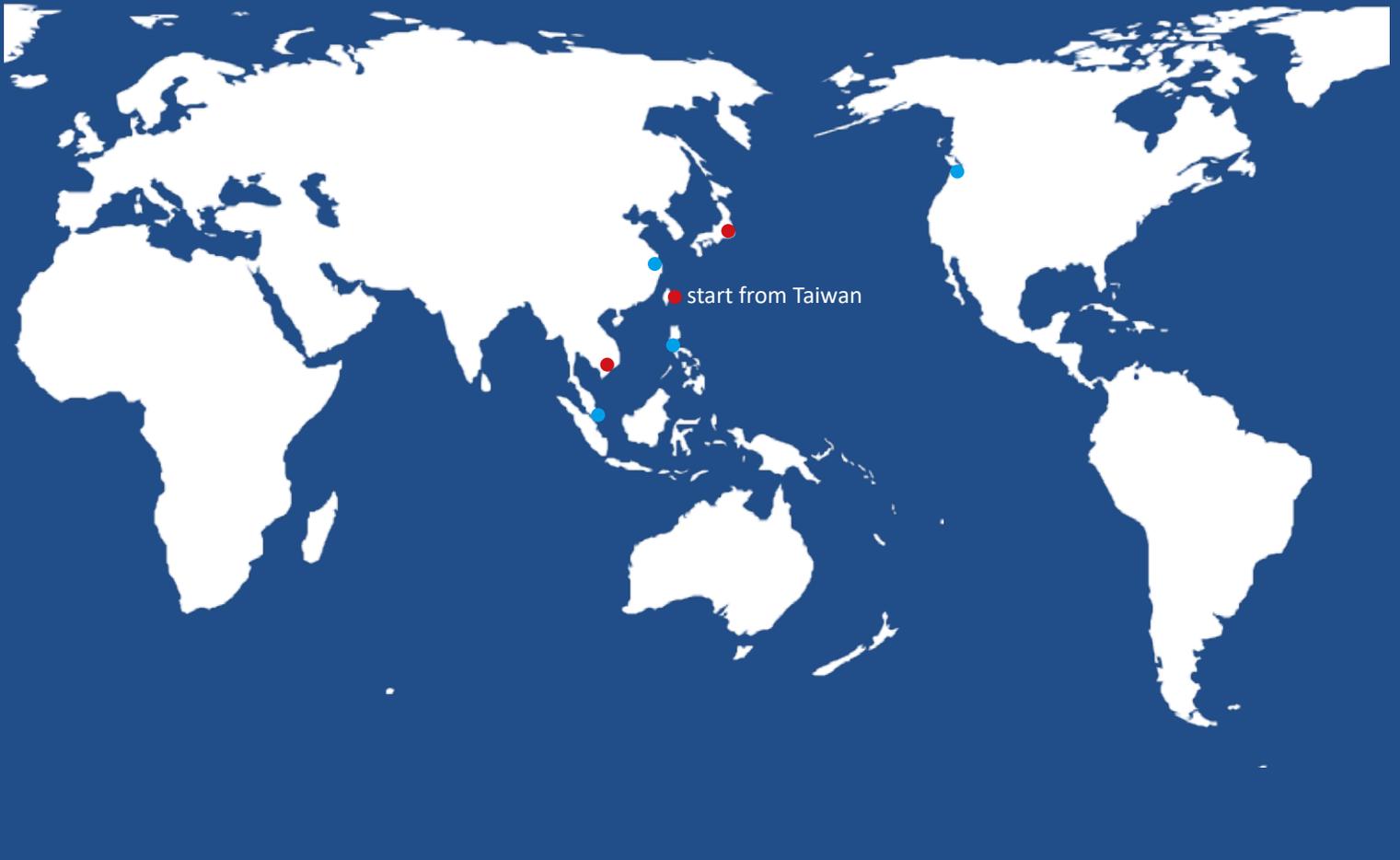
TAF Accredited Calibration Scope

Calibration Item	Calibration Range
Platinum Resistance Thermometer	-100 ~ 400°C
Thermocouple(R, S, B, K, E, J, T, N, temperature range depends on each TYPE)	-100 ~ 1554°C
Thermocouple with instrument(R, S, B, K, E, J, T, N, temperature range depends on each TYPE)	-100 ~ 1554°C
Various Temperature Instruments(Controller, Calibrator, Indicator, Recorder; temperature range depends on each TYPE)	-100 ~ 1750°C
Temperature Calibration On-site(Temperature Uniformity Survey, System Accuracy Test, Temperature Instruments; temperature range depends on each TYPE)	-80 ~ 1200°C

Calibration Service

IECQ Approved Calibration Scope

Calibration Item	Calibration Range
Platinum Resistance Thermometer	-80 ~ 400°C
Thermocouple(R, S, B, K, E, J, T, N, C, M, P, L, U, temperature range depends on each TYPE)	-80 ~ 1554°C
Various Temperature Instruments(Controller, Calibrator, Indicator, Recorder; temperature range depends on each TYPE)	-200 ~ 1750°C
Temperature Calibration On-site(Temperature Uniformity Survey, System Accuracy Test, Temperature Instruments; temperature range depends on each TYPE)	-150 ~ 1750°C
Pressure transducers	0 ~ 250 psi
Thermal Hygrometer	10 ~ 30°C ; 30 ~ 80%
Infrared Thermometer	35 ~ 500°C



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● Contact us for more overseas sales locations.

