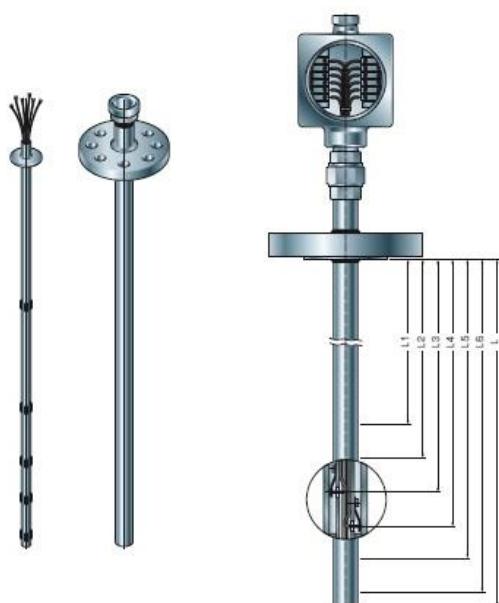


MULTIPOINT-MULTILEVEL

TEMPERATURE MEASUREMENT SOLUTIONS

Series MTR



Features

- Chemical and petrochemical industry
- Monitoring temperature profile for a wide range of application for installation in vessels, tanks or reactors where accurate temperature control is strategic.
- Flexible and compact design, available in a wide variety of process connection, junction box, constructions

Benefit

- Flexible installation
- Secondary containment
- Reducing cost of individual measurements points
- Optimized sensor designs for single measuring point replacement in the field
- Enclosure, thermoelements and protection tube can be supplied as a complete assembly

Applications

Reactors

Multipoint Temperature Profiling Sensors improve monitoring and control of the reaction process within chemical reactors. A prime example of how Multipoint Temperature Profiling Sensors are used is in the production of organic acid. Many organic acids are produced through an exothermic oxidation process. This chemical reaction takes place in multiple tubes filled with catalysts. The reaction components flow into the tubes, form reactions due to the catalyst, then flow out as an acid. These tubes are cooled by running a coolant around the tubes. A critical process parameter is the control of the operating temperature. A Multipoint Temperature Profiling Sensor can measure the temperature profile inside a reaction tube. Through monitoring the temperature profile, the flow of reaction components and coolant can be controlled to maximize the process output and reaction efficiency. A high local resolution of the temperature profile is required to ensure that the hot-spot (maximum measured temperature) does not reach the maximum allowable process temperature.

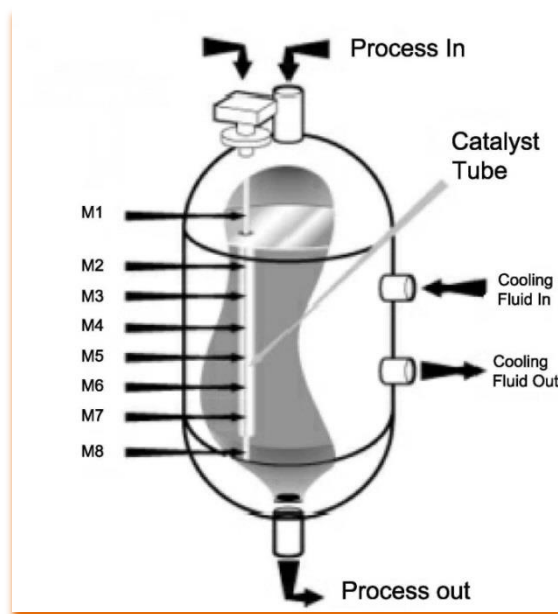


Figure 1. Reactor

Distillation columns/fractionators

In crude oil distillation processes, crude oil is heated and run into a distillation column or fractionators, where a significant temperature gradient is observed - high temperatures at the bottom, cooler at the top. Inside the column, crude oil is separated into components or fractions according to weight and boiling point. As these component vapors travel up, they condense to liquid form. These condensed components are captured by strategically mounted trays or "decks," located at a height where the column temperature matches a specific component's condensation point. The tray locations, or cut-points, are where products are then drawn from the column. Multipoint Temperature Profiling Sensors can be used to monitor the temperature at these cut-points and therefore control the temperature profile of the distillation column.

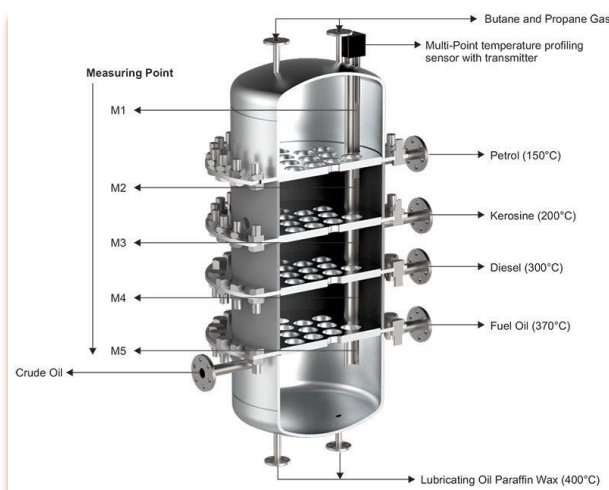


Figure 2. Distillation Column/Fractionators sample

Product Data Sheet

Input

<i>Measuring range</i>	<i>RTD:</i>		
	Input	Designation type	Measuring range limits
	RTD as per IEC 60751	Pt100	-200 to +600 °C (-328 to +1112 °F)
	<i>Thermocouple:</i>		
	Input	Designation type	Measuring range limits
	Thermocouple (TC) as per IEC 60584	- Type 'K' (NiCr-NiAl) - Type 'N' (Ni CrSi-NiSi) - Type 'J' (Fe-CuNi) - Type 'E' (NiCr-CuNi)	-40 to +1200 °C (-40 to +2192 °F) -40 to +1200 °C (-40 to +2192 °F) -40 to +750 °C (-40 to +1382 °F) -40 to +900 °C (-40 to +1652 °F)

Output

<i>Output signal</i>	Measured value Ways of Transmission - Directly-wired sensors (without transmitter) - Via all common protocols by selecting an appropriate transmitter - Analog transmitter or BUS signal
<i>Temperature Transmitters Protocol</i>	- PC programmable head transmitters 4-20mA HART programmable head transmitters - PROFIBUS head transmitters - FOUNDATION Fieldbus head transmitters
<i>Display</i>	Special design with display available

Sensor

<i>Sensing element</i>	Type	Nr. of elements
	- RTD - TC type K, N, J, E others on request	- Single, Double - Single, Double / Grounded, Ungrounded
	Number of measuring point	Insertion length
	On request (minimum 2, maximum 60)	Customer to specify [mm]
<i>Sheath</i>	Protection tube	Material
	Flexible Magnesium Oxide insulated cables	- AISI 316/316L - AISI 321 - AISI 310 - AISI 347 - AISI 446 - Alloy 600 - Hastelloy - Others on request (if available)

Accuracy

RTD	Class	Accuracy in accordance to DIN EN 60751
	A	$\pm(0.15K + 0.0020\text{ }^{\circ}\text{C})$
	B	$\pm(0.30K + 0.0050\text{ }^{\circ}\text{C})$

Thermocouples	Designation type	Limits of Error Interchangeability for Class I
	'K'	1.5 °C or 0.004 °C, -40 to 800 °C
	'N'	1.5 °C or 0.004 °C, -40 to 800 °C
	'J'	1.5 °C or 0.004 °C, -40 to 750 °C
	'E'	1.5 °C or 0.004 °C, -40 to 750 °C

Thermowell

Thermowell from Drilled Bar-stock or Pipe	Shape	Process connection	Size	Rating
	- Straight - Bended	- Flanged - Threaded - On-Site existing thermowell - Special version, to be specified for production	(ASME) 1" to 8" (EN) DN25 to DN200	Class 150# to 2500# PN40 to PN160

Enclosure / Connection Head

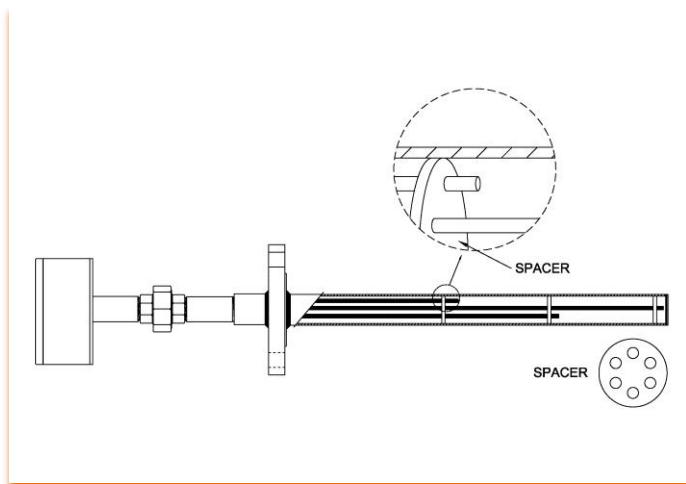
Junction Box	Material	Degree of protection (IP)	Approvals	Connection
	- Aluminum - AISI 316 - Others on request	IP65/66/67	ATEX, IECEx, UL, CSA, EAC	- Support rod - Neck tube - Safety chamber (as option)
	Configuration mounting			
	- Integral - Remote, with Extension wire (from Sensor to remote J.B.)			

Transmitters	Configuration mounting	Output	Hazardous area certifications
	- Direct (inside J.B.) - Remote (with Terminal Block inside J.B.)	- PC programmable head transmitters 4-20 mA HART Protocol - FOUNDATION Fieldbus - PROFIBUS PA	- ATEX Intrinsic Safety, Flameproof - IECEx Intrinsic Safety, Flameproof - UL, CSA Intrinsic Safety, Flameproof - EAC Intrinsic Safety, Flameproof - INMETRO Intrinsic Safety, Flameproof

Secondary Seal / Safety Chamber

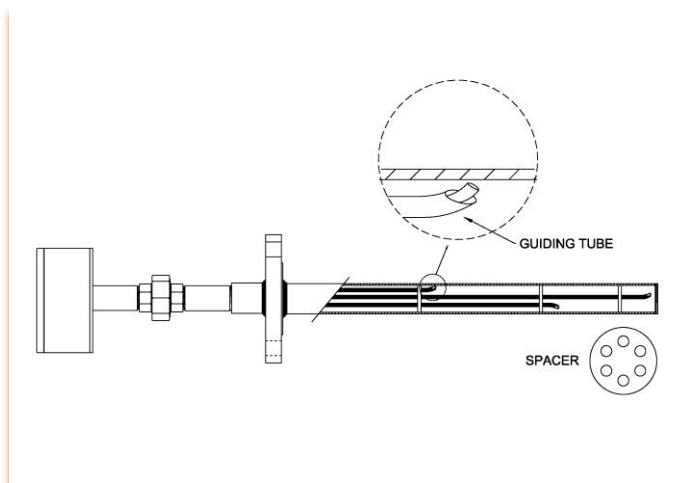
Secondary Seal / Safety Chamber	Model	Optional installation devices
	- Standard extension - Extension pipe with Cooling Fins	- Pressure Gauge - Manifold - Pressure transmitter

METRON standard model design



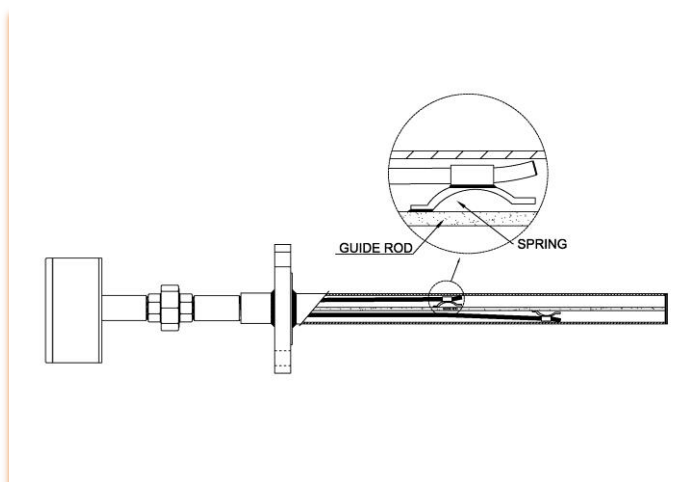
MTR-01 Multipoint with spacer design

MgO mineral insulated Thermocouples or RTD Pt100 with measuring points at desired length, bundled or mounted with spacers. Suitable for direct medium contact with open or perforated thermowells or where the bundle diameter tightly fills up the inner area of the thermowell to reduce thermal reaction time.



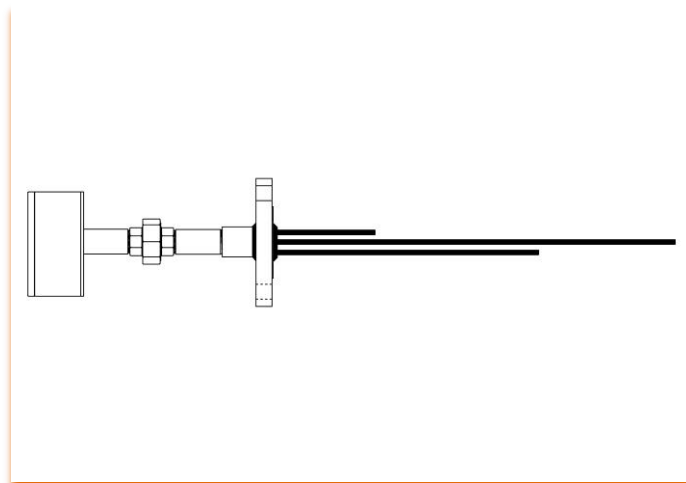
MTR-02 Multipoint with guiding tube design

MgO mineral insulated Thermocouples or RTD Pt100 inserted in individual guiding tube with measuring points at desired length. To prevent guiding tube rotation and to centre the multipoint into the thermowell spacer discs are provided.



MTR-03 Multipoint with spring load design

The springs are welded onto a guide rod allowing removal and replacement of the complete thermocouple bundle during operation. Spring load design maintain contact between Thermocouples / RTD and the internal thermowell wall at the desired measuring points length.



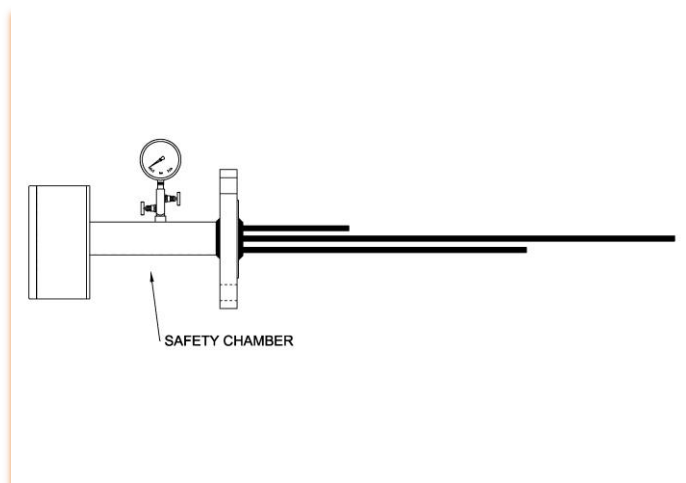
MTR-04 Free hanging Multipoint-Multilevel design

Multipoints Thermocouples / RTD Pt100 free hanging design are design to be freely guided around the internal wall of a reactor and inwards to the required measuring point.

Advantages are:

- a flexible MgO mineral insulated bendable cable, offering a greater area coverage.
- a redundant system by a multiple independent system to measure cross sectional and radial temperatures.

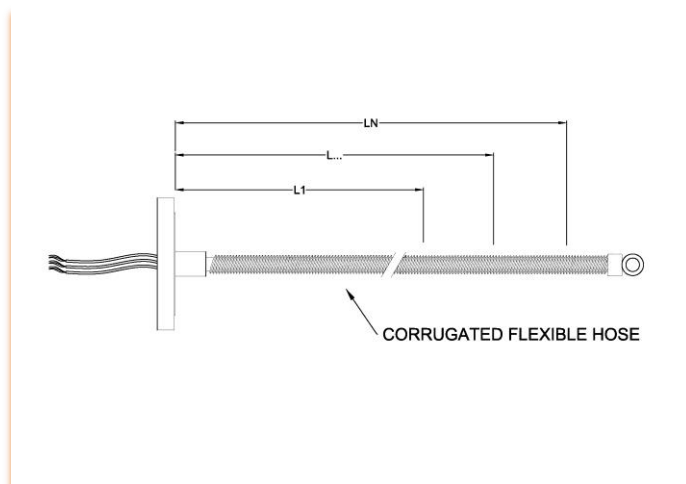
The sensors are having a metallic sheath, such as Stainless Steel, Inconel, etc. Suitable sub-assembly devices for thermal contact such as metallic supports, clamp, wall brackets and welding clips are available in a wide selection range and material.



MTR-05 Safety Chamber free hanging Multipoint-Multilevel design

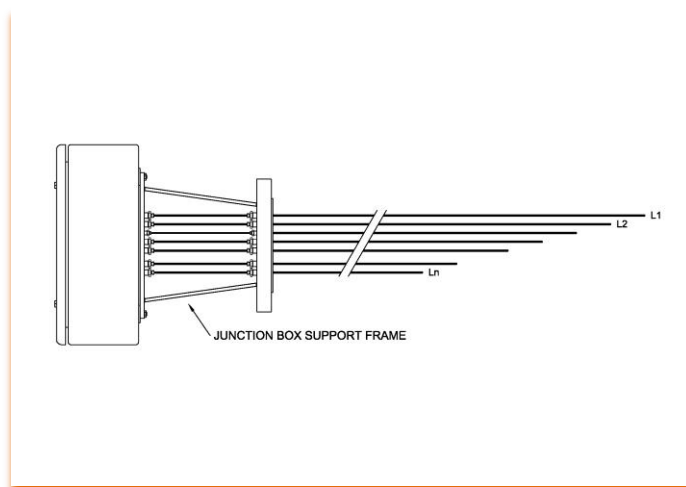
Free hanging reactor sensors normally have a single primary pressure containment. Safety chamber design provides a secondary pressure sealing & containment. In case failures appear below the flange or in the metal shield, such as leakage, the safety chamber prevents the escape of process fluids or gases to external environment.

As option, a pressure gauge and manifold can be supplied.



MTR-06 Multipoint with corrugated flexible hose design

MgO mineral insulated Thermocouples or RTD Pt100 inserted in a corrugated flexible hose at the desired measuring points length and connected to the bottom of the reactor/vessel with an anchor ring.

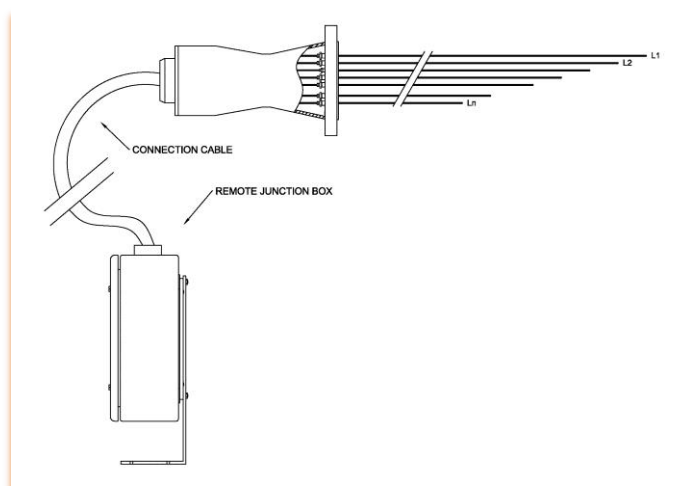


MTR-07 Multipoint with Junction Box support frame design

Multipoints Thermocouples / RTD Pt100 free hanging design are supplied without an outer protection tube to be freely guided around the internal wall of a reactor and inwards to the required measuring point.

Flexible sensing elements will be supplied as base material (individually, as per the required length) coiled and shall be uncoiled and assembled at site as per site condition. The supplied compression fittings shall be locked on flange and/or on Junction Box after the correct sensing elements positioning.

Suitable sub-assembly devices for thermal contact such as metallic supports, clamp, wall brackets and welding clips are available in a wide selection range and material.



MTR-08 Multipoint with Remote Junction Box design

The overall Multipoint Thermocouples / RTD assembly is composed by different sub-assemblies :

- individual flexible sensing elements
- connection flange with accessories
- connection cable
- remote Junction Box

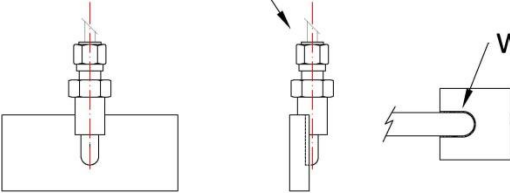
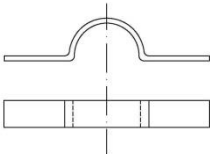
Mechanical construction and configuration based on specific process conditions required are available.

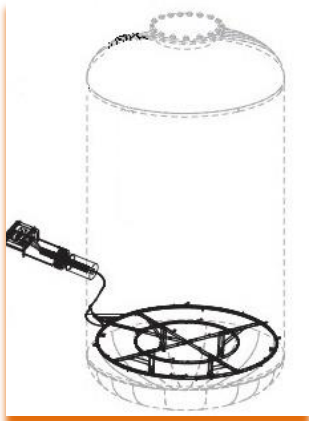
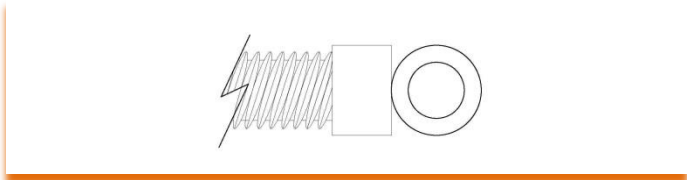
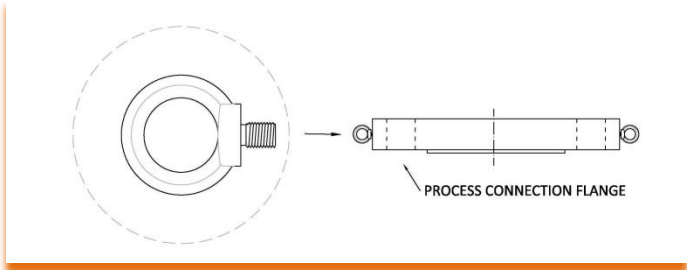


MTR-xx Multipoint Special design

Multipoint Thermocouples / RTD assembly based on client request

Accessories

Extension wires	Length [mm], only for remote configuration		Material - PVC - PTFE - PTFE (Shielded) - Others on request
	Customer to specify		
Thermowell	Type - Flanged thermowell (size on request) - Threaded thermowell (size on request) - On-Site existing thermowell - Special version, to be specified for production		
	Model - Standard extension (with Pressure Gauge, Manifold, as option) - Extension pipe with Cooling Fins		
Devices for Thermal contact	Device type	Sample draft drawings	
	Skin PAD	COMPRESSION FITTING 	
	Clamp	Side view of Clamp Front view of Clamp Top view of Clamp	
	Support Clip		

	Support Bracket	
	Anchor Ring	
Handling device (for easy installation)	Lifting Eyebolts (on flange process connection)	

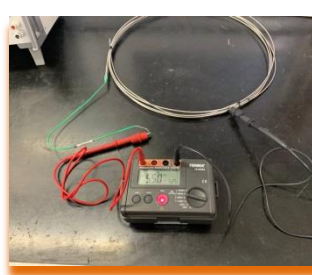
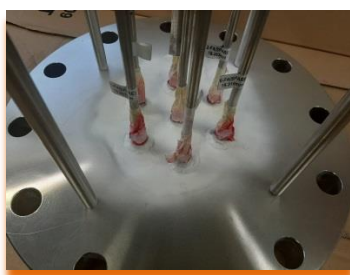
Test and Certificates

Multipoint thermocouples and RTD assemblies made by METRON meet the highest quality standards. Testing of the sensors and materials include:

- Dye Penetrant (LP)
- Hydrostatic pressure test (both internal and external)
- X-Ray examinations (RT)
- Ultrasonic testing (UT)
- Positive material identification (PMI)
- Thermocouple and RTD sensor calibration
- Electrical insulation test
- Third party inspection



Dye Penetrant test (LP)



Electrical insulation test



Calibration test



Positive material identification (PMI)



Pressure test



Inspection

