ASHCROFT®
Trust the shield.®

Multipoint Temperature Measurement Solutions for

Oil, Gas, Chemical, and Petrochemical Industry Applications

Welcome to Ashcroft

Ashcroft® offers a full line of pressure and temperature instruments.

Accurate, reliable and repeatable temperature measurements are essential to process operations. Plant personnel rely on temperature measurements for safety and process efficiency. Single point temperature measurements are utilized to monitor and protect critical assets. Multiple point measurements are essential to maintain reactor vessel internals and catalysts.

To ensure the safety of your operators and efficiency of your process, it's crucial to choose the best temperature instruments for your specific application. Ashcroft offers a variety of multipoint temperature measuring instruments for processing facilities, power plants and chemical reactors throughout the world.

Let us help keep your critical equipment and process running with reliable pressure and temperature measurements.

Contact us to help you with your next project:

1.800.328.8258

ashcroft.com

Introduction

Multipoints are multiple temperature sensing points housed within a protective sheath. They are available in large diameter and compact designs, and are custom designed with plant instrument, process, maintenance and reliability teams to meet each vessel's specific requirements.

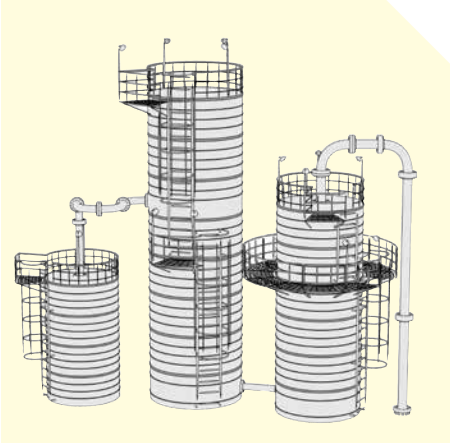
This guide will provide information about the applications in which multipoints are used, and how to select the right multipoint temperature measurement solution for your application.

TABLE OF CONTENTS

CHAPTER 1: Advantages for Applications

Multipoint temperature sensors are vital for measuring the different levels of temperature in a tank or reactor vessel. They offer many benefits for your process.

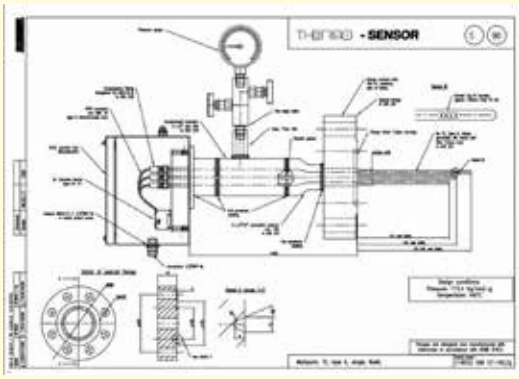
CATALYST PERFORMANCE



Within this critical process, which includes hydrocracking and hydrotreating in fixed bed reactors and catalyst reformer reactors, multipoints play a critical role in the success of licensed technology including catalyst performance.

A detailed and extensive examination of the catalyst performance allows refineries and chemical plants to make critical decisions when determining catalyst changes and upgrades. Performance records provided by instrumentation, including temperature, allows plant management to make upgrades recommendations.

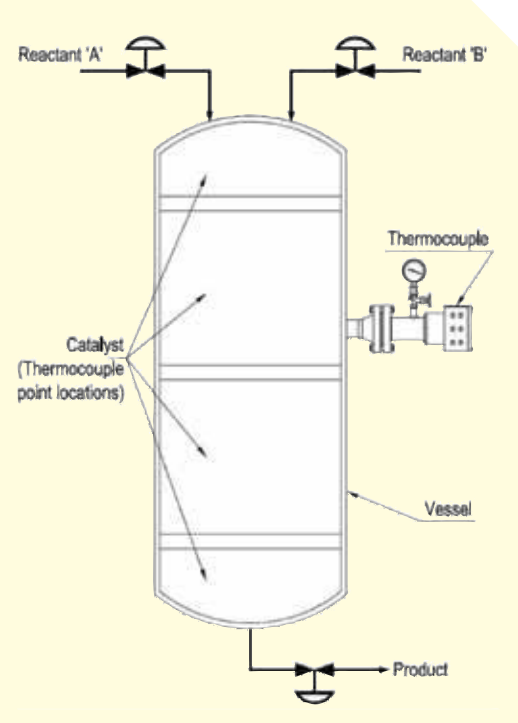
Process Licensors specify their technology and catalyst performance based on temperature differentials. Plants in turn must confirm catalyst has been loaded into the reactor correctly in order to provide the correct distribution in fixed bed reactors. To perform as specified, catalyst must be loaded and distributed correctly in fixed bed reactors. Good delta temperatures are an indicator of proper catalyst distribution.



UNIQUE ASSEMBLY DESIGNS

Temperature is the most widely measured process variable in industrial plants. The unique assembly designs of multipoint sensors provide a high number of data points to the plant's control systems from one single nozzle entry point.

Sensing points within a multipoint sheath can be positioned at varying levels within the protective sheath by process personnel to gain valuable insight into the vessel's process performance. Once this information is transferred from the multipoint into the control system, plant personnel can analyze the temperature gradient profile.



LARGE NUMBER OF DATA POINTS

Refining, petrochemical, chemical and process storage utilize the largest number of temperature data points. Within refining, petrochemical and chemical plants, multipoints support each unit's specific needs. Plant personnel use this important information to diagnose unfavorable conditions, and to identify and develop optimization opportunities.

Hydroprocessing is one example of many applications that use multipoints to keep reactors safe from temperature excursions, which could damage the catalyst and reactor, and ensure quality product yields that meet specifications.

CHAPTER 2: Multipoint Options and Features

Today, it has become essential to specify an appropriate temperature measurement system design in oil, gas, chemical and petrochemical applications. For optimized process operation, the temperature needs to be precisely controlled.

To obtain maximum product yield and quality while preserving the environment, Ashcroft has developed several technical solutions for multipoint temperature measurement in reactors, which ensure a uniform temperature profile through the reactor catalyst trays, offering safe designs suitable for each application.

Multipoint solutions that fulfill the requirements of the applications:

- **Straight multipoint for reactors** with spring-loaded thermal blocks or welded heat transfer blocks
- **Multi-thermowell flanged assemblies** with guide tube and compression devices
- **Flexible multipoint for reactors** with mineral insulation cables with standard, reinforced or double wall
- **MultiOne thermocouples for reactors** offer multiple sensing points along the length of MI-cable at various predetermined locations inside the catalyst bed
- **Multipoint accessories for reactors**, such as metal brackets, wall-mounting devices and soldering clip sources of thermal dissipation

STRAIGHT MULTIPOINT FOR REACTORS

These are designed to be inside a thermowell. To reduce the response time, the measuring points must be in contact with the thermowell wall.

Ashcroft offers several designs with spring-loaded blocks, with guide tubes for individual removal and replacement of sensors during operation, with guide discs or with blind tubes.

Numerous options are available:

- Different metallic alloys to suit the process conditions
- Rigid execution with compression devices
- Intrinsically safe transmitters with 4-20 mA HART/ Profibus /Fieldbus Foundation, among others

MULTI-THERMOWELL FLANGED ASSEMBLIES

Flanged assemblies of multiple thermowells allow measurement from temperature points along its length. Flexible multipoints allow you to locate measurement points where you need them.

The metallic support is designed to distribute the measurement points so as not to create sources of thermal dissipation.

MULTIPOINT THERMOCOUPLE WITH SPRING-LOADED THERMAL BLOCKS

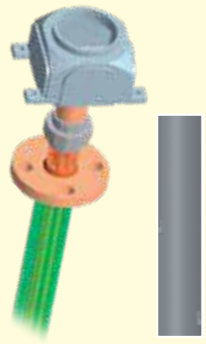
The spring loading allows the contact of the thermal block with the inner wall of the protection tube.

FLANGED MULTI-THERMOWELL ASSEMBLY

Each well is welded to a single flange. This design allows for individual replacement of sensors if necessary. The insulated extension wires are attached to a metal bracket welded to the top of the flange.

MULTIPOINT THERMOCOUPLES WITH GUIDE TUBE

The thermal block is welded to the wall of protection tube and to the inner guiding tube. The design allows individual replacement of sensors if required.



DISC-GUIDED MULTIPOINT THERMOCOUPLES

A guide disc holds the inserts in position within the protective tube. This design uses spacer discs to guide the sensing elements into their positions. For shipping, the spacer disk design cannot be coiled.

FLEXIBLE MULTIPOINT FOR REACTORS

The number of thermocouple points is determined by the nozzle size and thermocouple diameter. The flexible multipoint also features cables insulated with magnesium oxide of various diameters (3, 6, 8 mm, etc.), a double-sealed safety chamber and direct or remote mount connection head. Optional 4-20 mA HART/ Profibus / Fieldbus Foundation transmitters are available.

Flexible multipoints are designed to be in direct contact with the process fluid without the use of thermowells and withstand the high pressures and temperatures of the reactor. The thermocouple rod can be routed down the wall to the lower catalyst bed.

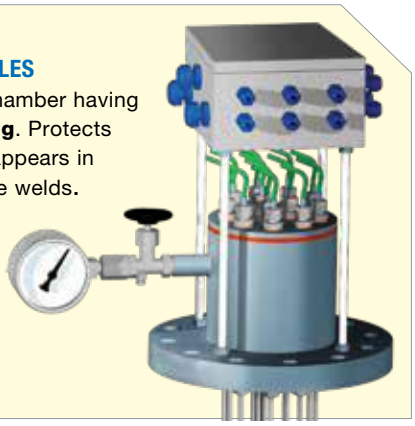
The thermocouple must be at least 75 mm from the support frame. The intention is to measure the catalyst temperature, not the support temperature.

Its functions include:

- Temperature reading at multiple points
- Indicate temperature variations
- Estimate the useful life of the catalyst

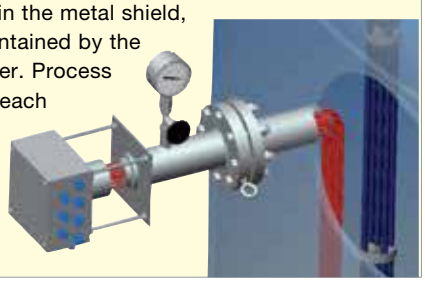
MULTIPOINT THERMOCOUPLES

With safety chamber having **single sealing**. Protects only if crack appears in process flange welds.

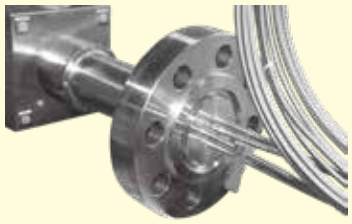


MULTIPOINT THERMOCOUPLES

With safety chamber having **double sealing.** If any cracks appear below the flange or in the metal shield, the leak is contained by the safety chamber. Process fluid will not reach the external environment.



ASHCROFT®
Trust the shield.®



MAGNESIUM OXIDE INSULATED CABLES,
single wall, reinforced or double in various metal alloys to suit process reactor specifications

COMPRESSION DEVICES
to seal the top of the security chamber

EXPLOSION PROOF HEAD WITH CABLE GLAND

CONVENTIONAL MULTIPOINT THERMOCOUPLE WITHOUT SECURITY CHAMBER

MULTIONE THERMOCOUPLE FOR REACTORS

- Offers multiple sensing points along the length of MI-cable at various predetermined locations inside the catalyst bed.
- These sensing points can be placed practically anywhere inside the reactor.
- At every location of hot junction, we will provide a weld deposit for visual permanent identification on every measuring point.

MULTIONE THERMOCOUPLE

Formed by mounting several individual thermocouples along the length of the same mineral insulated cable.

FLEXIBLE MULTIPOINT MINERAL INSULATED CABLES

Each sensor consists of a mineral cable that can measure temperature at various points on the catalyst tray.

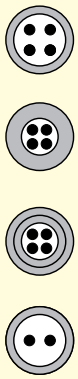
Various sizes of MI cable available:

- Ø ¼″ (6 mm or 6.35 mm) – greater number of thermocouples through a single flange
- Ø 5⁄16″ (8 mm) – industry standard for multipoint reactor
- Ø ⅜″ (9.5 mm) and ½″ inches (12.7 mm) – for increased durability in severe applications

REACTOR MULTIPOINTS

With standard 5⁄16″ or 8 mm MI cable

- Standard wall
- Reinforced wall for reactor
- Double wall available



Standard Wall

Heavy Wall

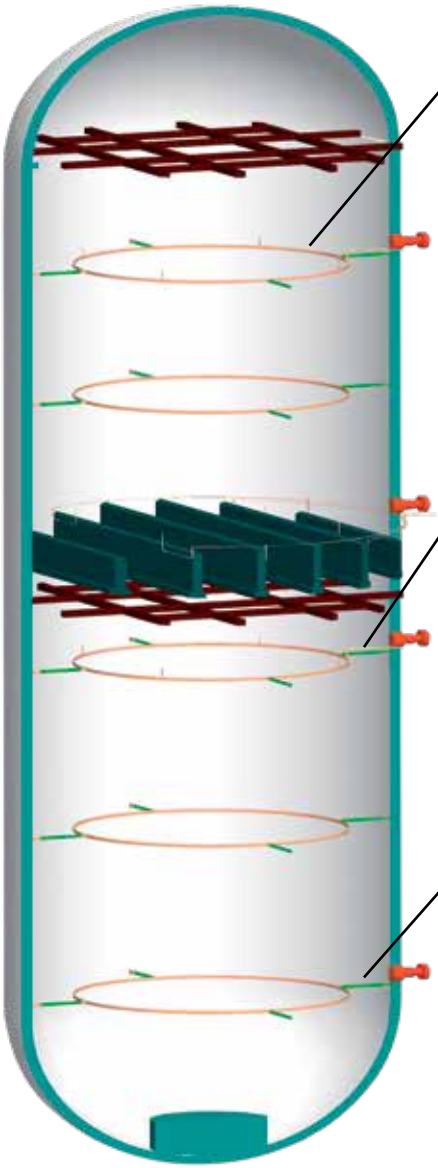
Double Wall

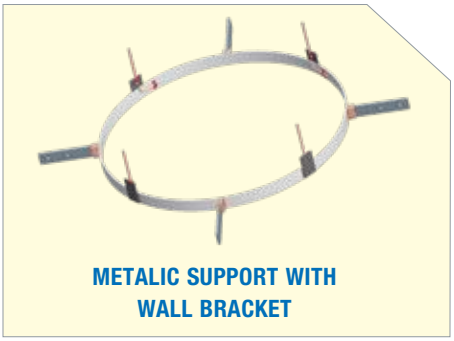
Single Junction with Standard Wall

MULTIPOINT ACCESSORIES

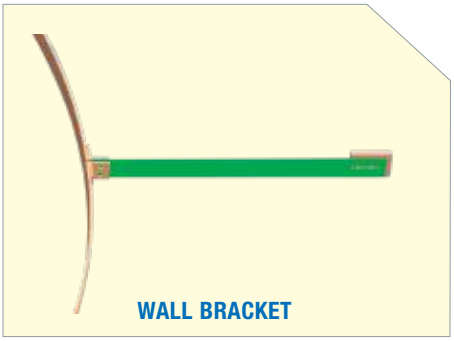
Accessories include:

- Base support to be placed on the inner wall of the reactor
- Wall brackets and welding clips
- Reduced thermal dissipation effect
- Materials such as 347 stainless steel, 321 stainless steel, and more, according to specification





METALIC SUPPORT WITH WALL BRACKET



WALL BRACKET

WELD CLIP

SENSOR ROUTING WITH WELD CLIPS

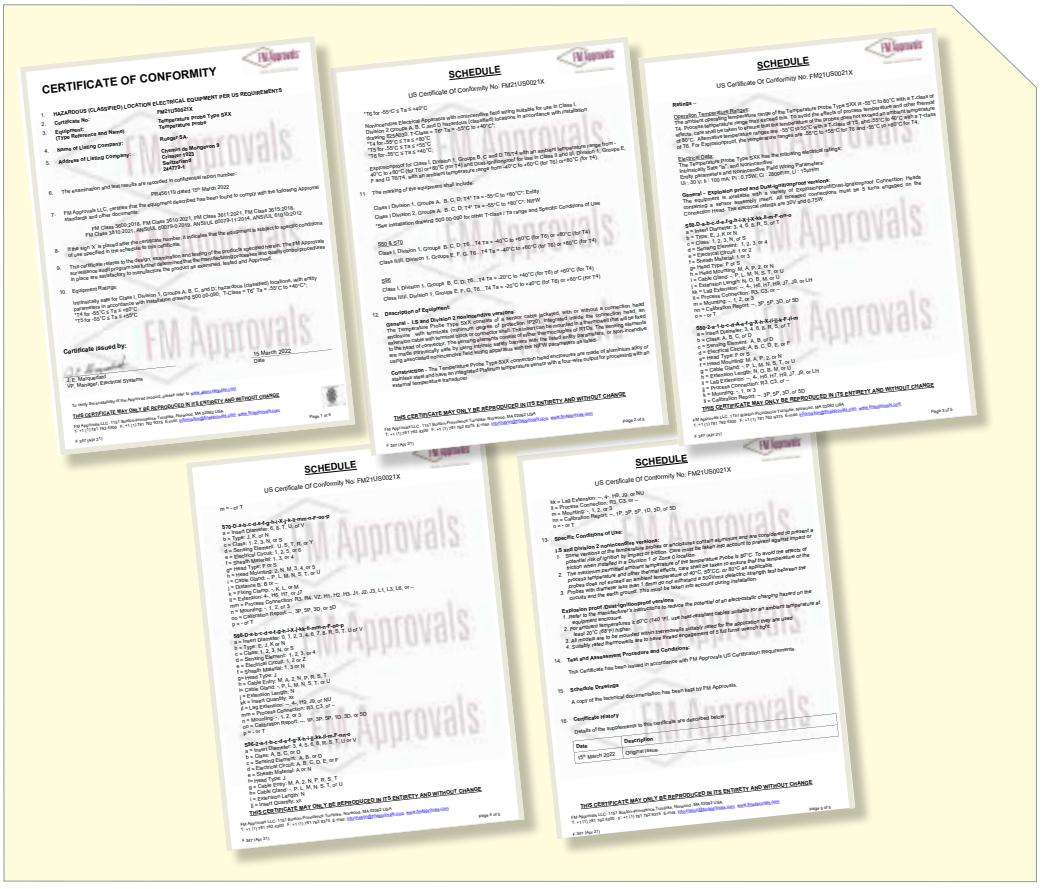
MULTIPOINT CERTIFICATIONS

Ashcroft offers the following hazardous location approvals and safety certifications that are required for your application:

- FM Intrinsically Safe, Non-Incendive and Explosion Proof for United States and Canada
- ATEX Ex i, Ex e, Ex d
- IECEx Ex i, Ex d
- INMETRO Ex i, Ex e, Ex d
- SIL2
- ISO 9001-2015
- EAC Customs Union

Other Certificates Available:

- Inspection under EN10204/3.1
- Conformity with EN10204/2.1
- Test Report EN10204/2.2
- Test and inspection report (RIT)



MULTIPOINT SUPERVISION AND COMMISSIONING

Upon request, we offer installation supervision services on your equipment.

CHAPTER 3:
Related Temperature Products

In addition to multipoint temperature sensors, Ashcroft provides a full line of accurate, reliable and repeatable temperature products. Full product details, including specifications, data sheets, instruction manuals, drawings and product/technical information are available on ashcroft.com. You can also view helpful information and resources in our Resource Center or talk to an expert to answer your questions or plan your next project.

Thermometers, RTDs & Thermocouples

		Bi-metal Thermometers	Gas Actuated Thermometers	RTD Probes	Thermocouple Probes
Model		**Model E**	**Duratemp® / S5500**	**S10, S50**	**S10, S50, S70**
Specifications	Accuracy	±1.0% of span	±0.5% of span ±1.0% of span ±1.6% of span	Class A Class B	Class 1 Class 2 Class 3 Standard Special
	Size & Case Features	2″, 3″, 5″ Stainless Steel, Hermetically Sealed	4½″, 100 mm, 160 mm, Stainless Steel	N/A	N/A
	Stem Lengths	2½″ to 60″	Direct 6″ to 36″, Remote 5′ to 80′	2″ to 120″ 50 mm to 3 m	2″ to 120″ 50 mm to 3 m
Ranges	Temperature	-80 °F to 1000 °F (-50 °C to 550 °C)	-320 °F to 1500 °F, (-200 °C to 800 °C)	Pt 100 -200 °C to 600 °C Pt 1000 -40 °C to 600 °C	Type J -40 °C to 750 °C Type E -200 °C to 800°C Type K -200 °C to 1100°C Type N -200 °C to 1100 °C

See datasheets at **ashcroft.com** for complete product specifications.

Temperature Switches




		B-Series Temperature Switch	B-Series Temperature Switch	L & G-Series Temperature Switch	P-Series Differential Temperature Switch
Model		**T4**	**T7**	**LT & GT**	**PT**
Specifications	Enclosure	Watertight epoxy coated aluminum NEMA 4, 4X, IP66	Watertight epoxy coated aluminum NEMA 7 & 9/IP66	NEMA 4X/IP66	NEMA 7 & 9/IP66
	Function	Single setpoint, fixed deadband, SPDT (or) single setpoint, fixed deadband, (2) SPDT (DPDT action)	Single setpoint, fixed deadband, SPDT (or) single setpoint, fixed deadband, (2) SPDT (DPDT action)	Dual independent setpoints, fixed deadband Single setpoint, adjustable deadband Single setpoint, fixed deadband	Dual independent setpoints, fixed deadband Single setpoint, adjustable deadband Single setpoint, fixed deadband
Ranges	Temperature	-40 °F to 750 °F (-40 °C to 400 °C)	-40 °F to 750 °F (-40 °C to 400 °C)	-40 °F to 750 °F (-40 °C to 400 °C)	-40 °F to 750 °F (-40 °C to 400 °C)

Thermowells



		Thermowell	Thermowell	Thermowell
Model		**Flanged**	**Threaded**	**Sanitary**
Specifications	Process Connection	1″, 1.5″, 2″, 3″, & 4″ Pipe Size	½, ¾, 1 NPT	1″, 1.5″, & 2″ Tri-Clamp
	Overall Length	Min U dimension 2″	Min U dimension 1″	Min U dimension 1″
	Materials	Variety of metallic materials	Variety of metallic materials	304 & 316 Stainless Steel



		Thermowell	Thermowell	Thermowell
Model		**Socket Weld**	**Weld-In**	**Van Stone**
Specifications	Process Connection	¾″ & 1″ Pipe Size	1.5″ Pipe Size	1″, 1.5″ Pipe Size
	Overall Length	Min U dimension 1″	Min U dimension 1″	Min U dimension 2″
	Materials	Variety of metallic materials	Variety of metallic materials	Variety of metallic materials

See datasheets at **ashcroft.com** for complete product specifications.

Choose Ashcroft for Your Temperature Measurement Solutions

Equipped with state-of-the-art electronic document control and project management software, our knowledgeable and skilled global support specialists help with engineering, procurement, and construction (EPC) and large projects around the world by identifying and providing successful instrument solutions. We can help you choose the right multipoint solutions for your application.

Plant personnel in industries such as oil and gas, chemical and petrochemical need quality pressure and temperature measurements to keep their critical equipment and processes running. Understanding that your process can't stop, Ashcroft designs and manufactures reliable instrumentation to meet the most challenging applications worldwide so you can confidently run your operation.

ashcroft.com

ashcroft.com
1.800.328.8258

ASHCROFT®
Trust the shield.®