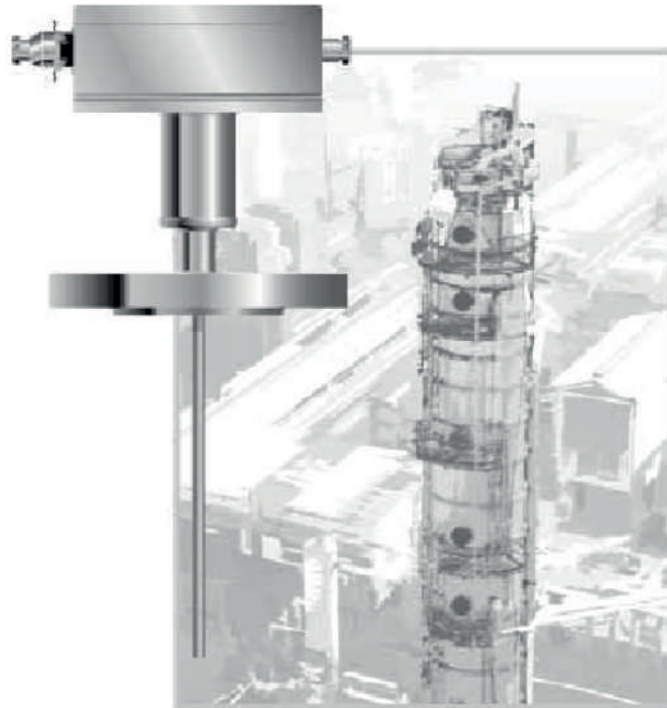


Maltec-T Multipoint Thermocouple and RTD Profiling Sensors



Features

- Effectively oversee temperature profiles across various applications, such as identifying hot spots in reactors
- Single-step insertion capable of accommodating up to 60 independent measurement points
- Compact design for individual measurement points
- Lowers the expense of individual measurement points
- Sensing elements are replaceable individually on-site
- A full assembly consisting enclosure, sensor and protective tube can be ordered

Maltec-T Multipoint Thermocouple and RTD Profiling Sensor

Optimize plant efficiency and increase measurement reliability with industry proven design

- Utilise a single temperature probe to a measure reactor profiles instead of several probes
- Enhanced sensor design with over six fundamental designs and numerous variants
- One probe has up to 60 measurement points
- Designs tailored for the replacement of individual measuring points



Easy implementation and installation in existing application

- Available in extensive range of process connections, junction boxes and design options
- Tailored designs facilitate installation without requiring a crane or protection tube

Achieve optimal efficiency with advanced High Density Transmitter technology

- Decrease the installation and engineering costs further by using Maltec-T High Density Transmitters

Explore the benefits of a Complete Point Solution from Maltec-T Temperature Measurement

- If requested, Dpstar can offer a complete point temperature solution, providing and installation-ready transmitter and sensor assembly
- Dpstar offers a comprehensive portfolio of Single Point and High Density Temperature Measurement solutions, enabling effective measurement and control of your processes with the trusted reliability of Maltec-T products

Content

Maltec-T Multipoint Thermocouple and RTD Profiling Sensor Page 2	Maltec-T MT8000F Configuration Data Sheet (CDS) Page 18
Maltec-T MT8000C Thermocouple Multipoint Sensor Compact Design Page 5	Maltec-T MT8000-2R RTD Multipoint Sensor Contacting Fixture Design Page 20
Maltec-T MT8000C Configuration Data Sheet (CDS) Page 10	Maltec-T MT8000-2R Configuration Data Sheet (CDS) Page 25
Maltec-T MT8000F Thermocouple Multipoint Sensor Contacting Fixture Design Page 12	Design overview Page 27

Experience global consistency and local support from numerous worldwide Maltec Temperature sites



- Experienced instrumentation consultants assist in selecting the appropriate product for various temperature applications and offer guidance on optimal installation practices
- A comprehensive global network of Dpstar service and support personnel can be on-site when and where they are needed

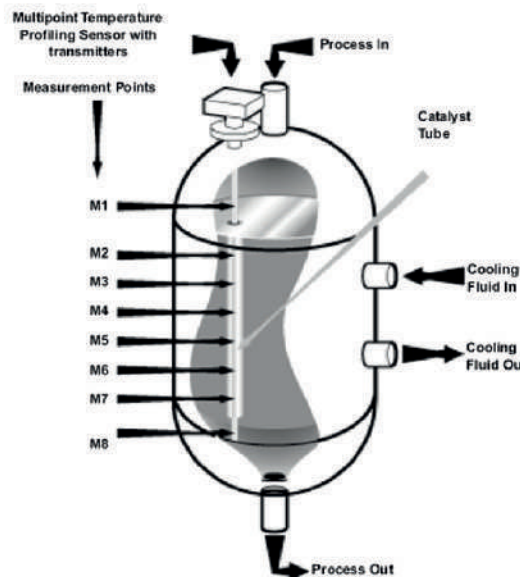
Introduction

Multipoint Temperature Profiling Sensor measure temperatures at various points along their length. Widely utilized in chemical and petrochemical sectors, they offer precise temperature profiles for chemical reactors, catalytic crackers and fractionation towers. These sensors stand out as the most efficient solution in terms of cost, maintenance and data acquisition for such applications. With a single pipe penetration, Multipoint Temperature Profiling Sensors enable the reading up to 60 points, providing a comprehensive temperature profile of columns, tanks or reactors.

Typical applications

Multipoint Temperature Profiling Sensor enhance the monitoring and regulation of the reaction process within chemical reactors. A notable application of Multipoint Temperature Profiling Sensors is observed in the production of organic acids. Many organic acids are manufactured through an exothermic oxidation process, occurring within multiple tubes filled with catalysts. In this process, reaction components enter the tubes, undergo reactions catalyzed by the catalyst, and exit as acid. These tubes are cooled by circulating a coolant around them. An essential process parameter is maintaining control over the operating temperature. A Multipoint Temperature Profiling Sensor can precisely measure the temperature profile inside a reaction tube. By monitoring this profile, the flow of reaction components and coolant can be adjusted to optimize process output and reaction efficiency. Achieving a high local resolution of the temperature profile is crucial to ensure that hot spots, representing the maximum measured temperature, do not exceed the maximum allowable process temperature.

Figure 1. Reactor

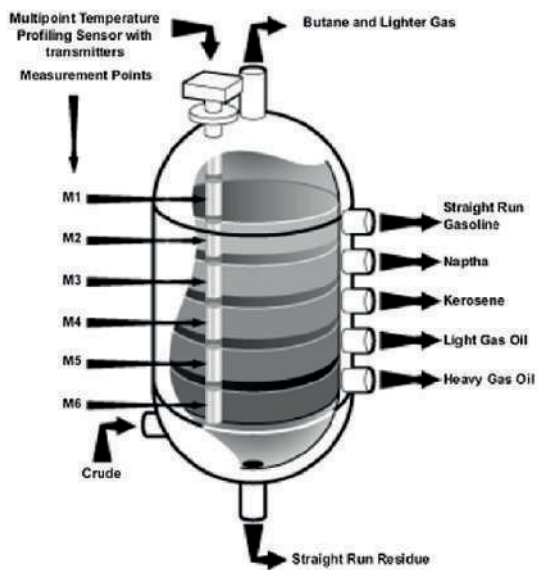


Maltec-T AIS Sensors

Distillation columns/fractionators

During crude oil distillation processes, crude oil undergoes heating and is directed into a distillation column or fractionators, where a notable temperature gradient is evident, with higher temperatures at the bottom and cooler at the top. Within the column, crude oil is fractionated into components based on weight and boiling point. As the vapors of these components ascend, they condense into liquid form. These condensed components are collected by strategically positioned trays or “decks” situated at a height where the column temperature corresponds to the condensation point of a specific component. These tray locations, known as cut-points, are where products are extracted from the column. Multipoint Temperature Profiling Sensors can be employed to monitor the temperature at these cut-points, thereby regulating the temperature profile of the distillation column.

Figure 2. Distillation Column/Fractionator



Maltec-T AIS Sensors

Maltec-T MT8000C Thermocouple Multipoint Sensor- Compact Design

The Maltec-T MT8000C serves as a compact Multipoint Sensor equipped with individual ungrounded thermocouples as its sensing elements. Its multitude of measurement points enables precise monitoring of temperature profiles with exceptional local resolution.

Widely utilized for:

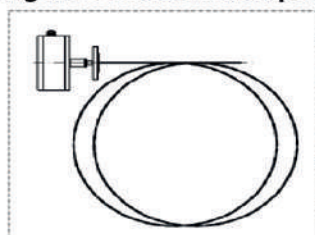
- Hot-spot detection
- Temperature profile monitoring

Finds particular utility in:

- Tall reactors
- Distillation columns

Typically, the Maltec-T MT8000C is supplied without a thermowell, as existing installations typically accommodate one. However, if a thermowell is needed, please reach out to Dpstar Process Management. The sensor is available with either an insert tube or in bundled configuration, detailed in [Figure 4](#) on [Page 6](#). The insert tube secures the sensing elements and provides mechanical stability. Models with an insert tube can be shipped up to 10 m (33 ft) in length, whereas bundled versions can extend up to 30 m (99 ft) and are shipped in coiled form as illustrated in [Figure 3](#).

Figure 3. Bundled Multipoint Sensor Coiled for Shipping



Specifications

Functional

Number of measurement points

2 to 60

Temperature limits

-40 to 750 °C (-40 to 1382 °F)

Physical

Table 1. Available Insert Tube Outer Diameters

mm	inch	Maximum measurement points
3.5	0.14	25
4.5	0.18	30
5.0	0.20	40
6.0	0.24	60
8.0	0.32	60

Table 2. Length Limits

With insert tube		Bundled version	
m	ft	m	ft
10	33	30	99

Performance

Ambient temperature limits

For enclosures and transmitters is -40 to 80 °C (-40 to 176 °F)

Insulation resistance

Greater than 1000 MOhm at room temperature. See [Table 3](#) for applied voltage

Table 3. Applied Voltage for Insulation Resistance Measurement (based on minearally insulated cable outside diameter)

mm	inch	Test voltage
0.34	0.013	75 VDC
0.50	0.020	100 VDC
1.00	0.039	250 VDC

Accuracy

Table 4. Limits of Error Interchangeability for Class I Thermocouples

Type	
E	1.5 °C or 0.004 t ⁽¹⁾ , -40 to 750 °C
J	1.5 °C or 0.004 t ⁽¹⁾ , -40 to 750 °C
K	1.5 °C or 0.004 t ⁽¹⁾ , -40 to 750 °C
N	1.5 °C or 0.004 t ⁽¹⁾ , -40 to 750 °C

1. Whichever is greater. "t" is in degrees Celsius.

Maltec-T AIS Sensors

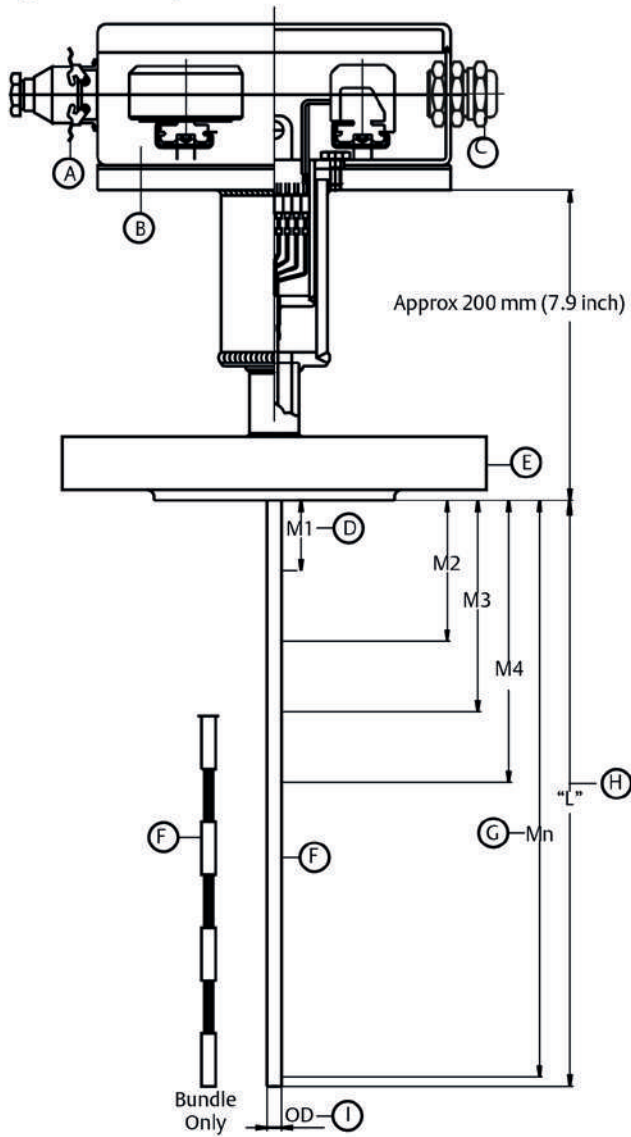
Enclosures

The enclosures are described in “Enclosures with mounting hardware” on page 29.

Individual sensor identification data

By default, sensor 1 is closest to the flange. Remaining points are numbered incrementally. Use the C1 option and the CDS if a different numbering system is desired.

Figure 4. Multipoint Sensor Maltec-T MT8000C Compact



- A. Enclosure entry (Han®-Plug Connection)
- B. Enclosure type (see “Enclosures with mounting hardware” on page 29)
- C. Enclosure entry (cable glands)
- D. First measurement point location
- E. Mounting style

- F. Insert tube material (stainless steel/alloy insert)
- G. Number of measurement points
- H. Insertion length “L”
- I. Insert tube outer diameter

Maltec-T AIS Sensors

Ordering information

Table 5. Maltec-T MT8000C Ordering Information

Model	Product description				
MT8000C	Maltec-T MT8000C Thermocouple Multipoint Profiling Sensor- Compact Design - Tolerance Class 1				
Thermocouple type			Operating temperature range		
			°C	°F	
E1	E		-40 to 750	-40 to 1382	
J1	J		-40 to 750	-40 to 1382	
K1	K		-40 to 750	-40 to 1382	
N1	N		-40 to 750	-40 to 1382	
Number of measurement points					
08	8				
16	16				
24	24				
32	32				
40	40				
48	48				
XX	Other quantities (minimum = 02; maximum = 60)				
Transmitter mounting hardware ⁽¹⁾			Maximum measuring points		
A	With mounting hardware		48		
N	With no transmitter hardware; terminal strips only		60		
Enclosure type ⁽¹⁾		Material	IP rating	NEMA® rating	
A	EEx d CENELEC Flameproof Approval (consult factory for availability)		Aluminum	65	NEMA 4
B	EEx e CENELEC Increased Safety Approval (consult factory for availability)		Aluminum	65	NEMA 4
C	EEx i Intrinsically Safety acc. EN 50014 and EN 50020 with manufacturer declaration for Ex i use in Zone 1		Aluminum	65	NEMA 4
D	Standard aluminum		Aluminum	65	NEMA 4
E	Standard polyester		Polyester	65	NEMA 4
S	Special enclosure type (Configuration Data Sheet required)				

Maltec-T AIS Sensors

Table 5. Maltec-T MT8000C Ordering Information

Enclosure entry			
1	Single multi-core cable gland		
2	Multiple cable glands M20 x 1.5 (one per measurement point)		
3	Han-Plug Connection IP65		
4	Customer specified (Configuration Data Sheet required)		
Insert tube material			Maximum temperature
			°C °F
D	Stainless steel - DIN 1.4404 (ANSI 316L)		450 842
P	Alloy		750 1382
B	Bundle only - DIN 1.4404 (ANSI 316L) (no insertion tube)		450 842
C	Bundle only - alloy (no insertion tube)		750 1382
S	Special tube material - customer specified (Configuration Data Sheet required)		
Insert tube outer diameter			Maximum measuring points
00	No insert tube (used with insert tube material codes B and C)		
35	3.5 mm (0.14 inch)		25
45	4.5 mm (0.18 inch)		30
50	5.0 mm (0.20 inch)		40
60	6.0 mm (0.24 inch)		60
80	8.0 mm (0.32 inch)		60
Insertion length "L"			
01000	1000 mm (39 inch)		Length code is in mm. To convert to mm multiply the length in inches by 25.4.
02000	2000 mm (79 inch)		
03000	3000 mm (118 inch)		
05000	5000 mm (197 inch)		
07000	7000 mm (276 inch)		
10000	10000 mm (394 inch)		
XXXXX	Other lengths (maximum 10000mm [394 inch] with insert tube) (maximum 30000mm [1181 inch] bundle only)		
Measurement point distribution			
A	Equally distributed points		
C	Customer specified (Configuration Data Sheet required)		
First measurement point location (distance from base of mounting flange)			
00500	500 mm (20 inch)		
01000	1000 mm (39 inch)		
02000	2000 mm (79 inch)		
03000	3000 mm (118 inch)		

Maltec-T AIS Sensors

Table 5. Maltec-T MT8000C Ordering Information

04000	4000 mm (158 inch)	
XXXXX	Other lengths	
Mounting style–flange material=DIN 1.4571 (ANSI 316Ti)		Process connection
F06	Flanged, ANSI	1-in. Class 150 RF
F12	Flanged, ANSI	1½-in. Class 150 RF
F18	Flanged, ANSI	2-in. Class 150 RF
F24	Flanged, ANSI	1-in. Class 300 RF
F30	Flanged, ANSI	1½-in. Class 300 RF
F36	Flanged, ANSI	2-in. Class 300 RF
F42	Flanged, ANSI	1-in. Class 600 RF
F48	Flanged, ANSI	1½-in. Class 600 RF
F54	Flanged, ANSI	2-in. Class 600 RF
F66	Flanged, ANSI	1½-in. Class 900 RF
F72	Flanged, ANSI	2-in. Class 900 RF
D06	Flanged, DIN	DN 25 PN 16
D12	Flanged, DIN	DN 25 PN 40
D18	Flanged, DIN	DN 40 PN 16
D24	Flanged, DIN	DN 40 PN 40
D28	Flanged, DIN	DN 50 PN 40
CDS	Customer specified (Configuration Data Sheet required)	
Additional options		
Special tagging and configuration options		
C1 ⁽²⁾	Customer specified tagging and transmitter configuration–Configuration Data Sheet Required	
Thermowell options		
R16	Ring joint flange (ASME B16.5 ANSI flanged thermowells only)	
Typical model number: MT8000C J1 08 D 1 D 35 01000 A 00500 F36		

1. Transmitter must be ordered separately.
2. Shipped with default numbered tagging of all measurement points. The first measurement point (closest to the enclosure) is tag "1." If other configuration is required, order option code C1.

Maltec-T AIS Sensors

Maltec-T MT8000C Configuration Data Sheet (CDS)

Page one

Copy this form, complete it as required, and fax it to the appropriate fax number listed on the next page

Customer name: _____

Address: _____

Contact person: _____

Phone: _____

Fax: _____

Date: _____

Number of pages: _____

Maltec-T order / Quote number: _____

Model number: _____

Enclosure type:

- Selected as Standard option in model structure
- Special requirement: _____

Enclosure entry:

- Selected as Standard option in model structure
- Special requirement: _____

Insert tube material:

- Selected as Standard option in model structure
- Special requirement:
 - DIN 1.4401 (ANSI 316)
 - DIN 2.4816 (ASTM A494 [Alloy])
 - Other: _____

Mounting style:

- Selected as Standard option in model structure
- Special requirement:
 - Flange rating: _____
 - Flange material:
 - DIN 1.4401 (ANSI 316)
 - DIN 2.4816 (ASTM A494 [Alloy])
 - Other: _____

Maltec-T AIS Sensors

Page two

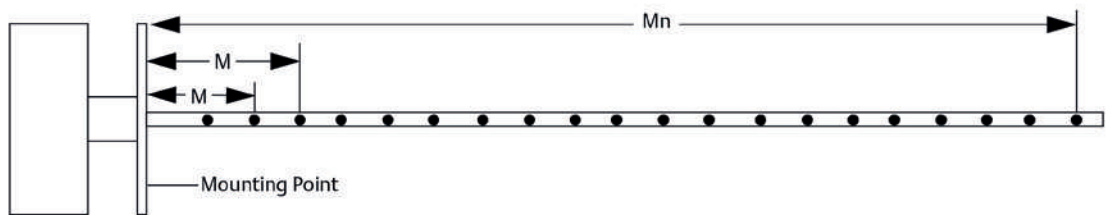
Measurement point distribution:

- Selected as Standard option in model structure
- Special requirement (fill in table below)

Tagging:

- Default
- Special requirement (fill in table below)– use with option code C1.

Point	Distance from mounting point	Point tag	Transmitter tag	Transmitter range
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
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33				



Maltec-T AIS Sensors

Maltec-T MT8000F Thermocouple Multipoint Sensor-Contacting Fixture Design

The Maltec-T MT8000F Multipoint Sensor embodies versatility, robustness and exceptional reliability, boasting an extended lifespan. Its measurement elements consist of individual ungrounded single thermocouples, with a maximum of 20 measurement points. These sensors are intended for temperature profile measurement applications where a high local resolution is not essential. The Maltec-T MT8000F can be customized with or without a thermowell and is offered in three distinct sensor configurations: Individual Guide Tube design, Radial Spring design and Laminated Spring Design.

Individual guide tube design

The individual guide tube design allows for replaceable elements, as shown in [Figure 5](#). Mineral insulated thermocouple elements are inserted into each guide tube and directed to the desired measurement point. With spring-loaded fittings, fast response time is achieved, though the thermowell interior remains unsealed. Compression fittings seal the thermowell but may slightly compromise thermal contact. Notably, the guide tube design, with or without a thermowell, cannot be coiled for shipping, requiring careful planning during transportation.

Radial spring design

This design ensures optimal thermal contact between the thermocouple and thermowell. A radial spring in this configuration presses the thermocouple against the inner wall of the thermowell, ensuring full thermal contact with the flattened MI cable. This setup guarantees the fastest possible response time. If ordered without a thermowell, it will be shipped as a coil, and individual thermocouples cannot be replaced.

Laminated spring design

This design ensures efficient thermal contact between the thermocouple and thermowell, enabling a rapid response time. The laminated spring applies pressure to the thermocouple against the inner wall of the thermowell as depicted in [Figure 5](#), making it suitable for angled mounting flanges. The advantage of this design is the flexibility of the insert, which is similar to the flexibility of an oil dipstick.

This design allows the sensor to follow the contour of the thermowell. If the laminated spring multipoint sensor is ordered without a thermowell, it will be shipped as a coil, and individual thermocouples cannot be replaced.

Thermowell

Every Maltec-T MT8000F requires a thermowell for proper operation. If the Maltec-T MT8000F is ordered without a thermowell, check the inner diameter of the existing thermowell ([refer to Table 6](#)). The inner surface of the thermowell must be smooth, particularly at the weld joints, to prevent any damage to the multipoint sensor during insertion.

Specifications

Functional

Number of measuring points

2 to 20

Temperature limits

- Type E and J: -40 to 750 °C (-40 to 1382 °F)
- Type K and N: -40 to 800 °C (-40 to 1472 °F)

Physical

Length limits

- 10 m (33 ft) with thermowell– all designs
- 30 m (99 ft) without thermowell– Radial and Laminated designs only

Physical dimensions

Table 6. Thermowell Diameter for Guide Tube and Laminated Spring Design

Number of measurement points	O.D.		I.D.	
	mm	inch	mm	inch
2-in. schedule 80				
2 to 5	60.33	2.34	49.25	1.94
2 1/2-in. schedule 80				
6 to 8	73	2.9	59	2.3
3-in. schedule 80				
9 to 20	88.9	3.5	73.7	2.9

Maltec-T AIS Sensors

Table 7. Thermowell Diameter for Radial Spring Design

Number of measurement points	O.D.		I.D.	
	mm	inch	mm	inch
2 to 8	73.0	2.9	59.0	2.3
9 to 20	88.9	3.5	73.7	2.9

Performance

Ambient temperature limits

For the enclosures and transmitters is -40 to 80 °C (-40 to 176 °F)

Insulation resistance

Greater than 1000 MOhm at room temperature, test voltage is 500 VDC

Accuracy

Table 8. Limits of Error Interchangeability for Class I Thermocouples

Type	
E	1.5 °C or 0.004 t ⁽¹⁾ , -40 to 750 °C
J	1.5 °C or 0.004 t , -40 to 750 °C
K	1.5 °C or 0.004 t , -40 to 800 °C
N	1.5 °C or 0.004 t , -40 to 800 °C

1. Whichever is greater. "t" is in degrees Celsius.

Enclosures

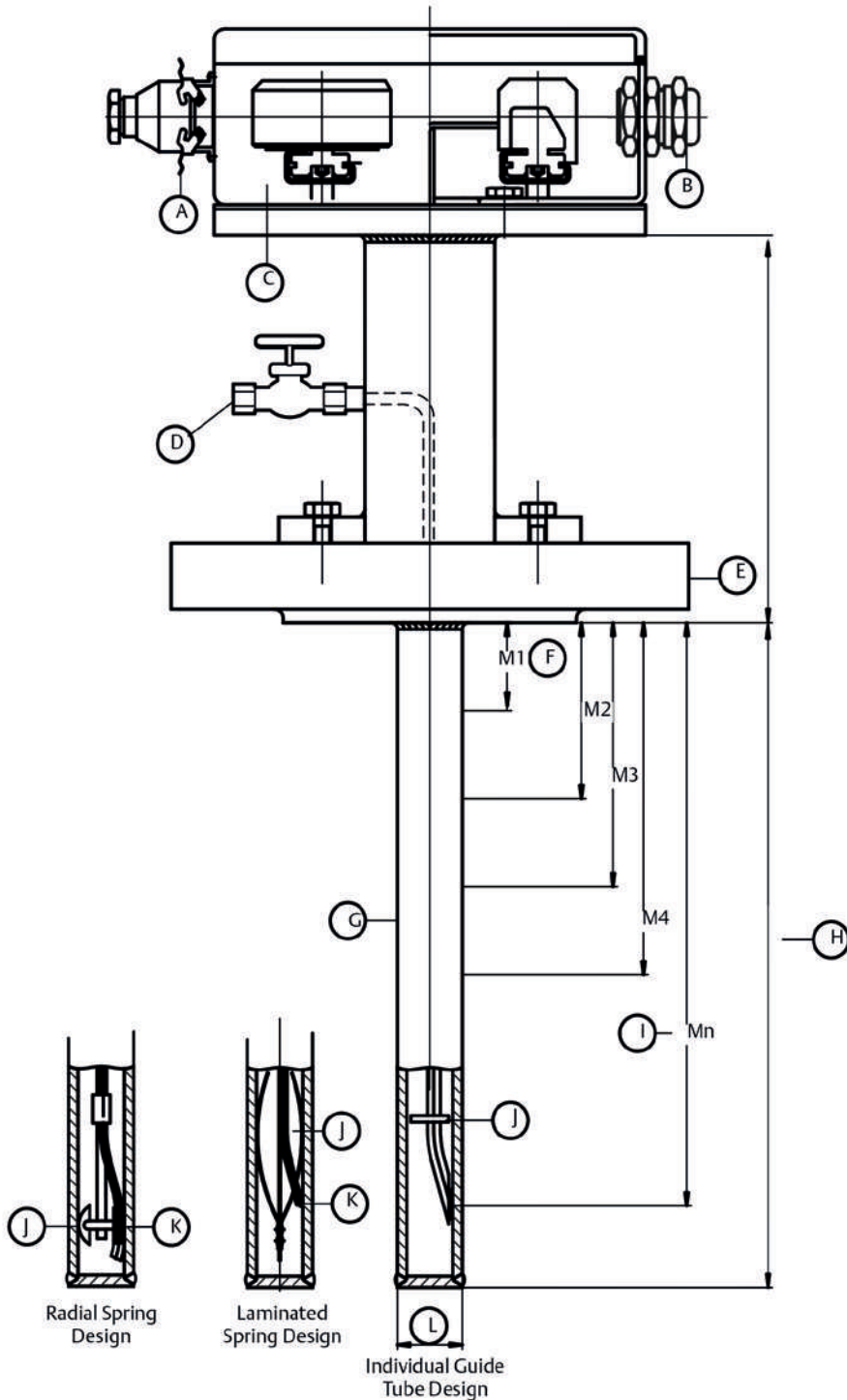
The enclosures are described in "Design overview" on page 27.

Individual sensor identification data

By default, sensor 1 is closest to the flange. Remaining points are numbered incrementally. Use the C1 option and the CDS if a different numbering system is desired.

Maltec-T AIS Sensors

Figure 5. Multipoint Sensor Maltec-T MT8000F Thermocouple Multipoint Sensor (Contacting Fixture Design)



- | | |
|---|---|
| <ul style="list-style-type: none"> A. Enclosure entry (Han-Plug connection) B. Enclosure entry (Cable glands) C. Enclosure type (see "Enclosures with mounting hardware" on page 29) D. Leak check valve (optional) E. Mounting style F. First measurement point location | <ul style="list-style-type: none"> G. Thermowell material H. Immersion length "U" I. Number of measurement points J. Element of fixation method K. Thermocouple type L. Thermowell diameter |
|---|---|

Maltec-T AIS Sensors

Ordering information

Table 9. Maltec-T MT8000F Ordering information

Model	Product description			
MT8000F	Maltec-T MT8000F Thermocouple Multipoint Profiling Sensor- Contacting Fixture Design, Tolerance Class 1			
Code	Element fixation method			
1	Individual guide tubes, compression fittings, replaceable elements			
2	Individual guide tubes, spring loaded fittings, replaceable elements			
3	Laminated spring design, compression fittings, fixed elements			
4	Radial spring design, fixed elements			
Code	Thermocouple type	Operating temperature range		
		°C	°F	
E1	E	-40 to 750	-40 to 1382	
J1	J	-40 to 750	-40 to 1382	
K1	K	-40 to 800	-40 to 1472	
N1	N	-40 to 800	-40 to 1472	
Code	Number of measurement points			
03	3			
08	8			
12	12			
16	16			
20	20			
XX	Other quantities (minimum. 02; maximum. 20)			
Code	Transmitter mounting hardware ⁽¹⁾		Maximum measuring points	
A	With mounting hardware		20	
N	With no transmitter hardware; terminal strips only		20	
Code	Enclosure type ⁽¹⁾	Material	IP rating	NEMA rating
A	EEx d CENELEC Flameproof Approved (consult factory for availability)	Aluminum	65	NEMA 4
B	EEx e CENELEC Increased Safety Approval (consult factory for availability)	Aluminum	65	NEMA 4
C	EEx i Intrinsically Safety acc. EN 50014 and EN 50020 with manufacturer declaration for Ex i use in Zone 1	Aluminum	65	NEMA 4
D	Standard aluminum	Aluminum	65	NEMA 4
E	Standard polyester	Polyester	65	NEMA 4
S	Special enclosure type (Configuration Data Sheet required)			

Maltec-T AIS Sensors

Table 9. Maltec-T MT8000F Ordering information

Code	Enclosure entry		
1	Single multi-core cable gland		
2	Multiple cable glands M20 x 1.5 (one per measurement point)		
3	Han-Plug connection IP65		
4	Customer specified (Configuration Data Sheet required)		
Code	Thermowell material	Maximum temperature	
		°C	°F
D	Stainless steel - DIN 1.4404 (ANSI 316L)	450	842
P	Heat resistant steel-DIN 1.7380 (ANSI 182-F22)	800	1472
S	Special tube material - customer specified (Configuration Data Sheet required)	Consult factory	
N	No thermowell		
Code	Thermowell diameter		
A	Standard—see Table 7		
C	Customer specified (Configuration Data Sheet required)		
Code	Immersion length “U”		
01000	1000 mm (39 inch)	Note: Length code is in mm. To convert to mm multiply the length in inches by 25.4.	
02000	2000 mm (79 inch)		
03000	3000 mm (118 inch)		
05000	5000 mm (197 inch)		
07000	7000 mm (276 inch)		
10000	10000 mm (394 inch)		
XXXXX	Other length maximum 10000mm (394 inch with thermowell) (maximum 30000 mm (1181 inch) without thermowell—laminated and radial spring designs only)		
Code	Measurement point distribution		
A	Equally distributed points (last point placed approx 50 mm from the bottom of the thermowell)		
C	Customer specified (Configuration Data Sheet required)		
Code	First measurement point location—distance from base of mounting flange		
00500	500 mm (20 in)		
01000	1000 mm (39 in)		
02000	2000 mm (79 in)		
Code	First measurement point location—distance from base of mounting flange		
03000	3000 mm (118 in)		
04000	4000 mm (158 in)		
XXXXX	Other lengths		

Maltec-T AIS Sensors

Table 9. Maltec-T MT8000F Ordering information

Code	Mounting style–flange material= DIN 1.4404 (ANSI 316L)	Process connection
F36	Flanged, ANSI	2-in. Class 300 RF
F74	Flanged, ANSI	2 1/2-in. Class 300 RF
F76	Flanged, ANSI	3-in. Class 300 RF
F54	Flanged, ANSI	2-in. Class 600 RF
F78	Flanged, ANSI	2 1/2-in. Class 600 RF
F80	Flanged, ANSI	3-in. Class 600 RF
F72	Flanged, ANSI	2-in. Class 900 RF
F82	Flanged, ANSI	2 1/2-in. Class 900 RF
F84	Flanged, ANSI	3-in. Class 900 RF
D26	Flanged, DIN	DN 50 PN 25/40
CDS	Customer specified (Configuration Data Sheet required)	
Code	Additional options	
	Special tagging and configuration options	
C1 ⁽²⁾	Customer specified tagging and transmitter configuration (Configuration Data Sheet required)	
	Thermowell options	
Q8	Thermowell material certification, DIN EN 10204 3.1.B	
R01	Thermowell pressure testing	
R03	Thermowell dye penetration testing	
R07	Full penetration weld	
R16	Ring joint flange (ASME B16.5 ANSI flanged thermowells only)	
	Process connection options	
P01	Leak check valve	
Typical model number: MT8000F 2 J1 08 A D 1 D A 01000 A 00500 F36 R01 P01		

1. Transmitter must be ordered separately.
2. Shipped with default numbered tagging of all measurement points. The first measurement point (closest to the enclosure) is tag "1." If other configuration is required, order option code C1.

Maltec-T AIS Sensors

Maltec-T MT8000F Configuration Data Sheet (CDS)

Page one

Copy this form, complete it as required, and fax it to the appropriate fax number listed on the next page

Customer name: _____

Address: _____

Contact person: _____

Phone: _____ Fax: _____

Date: _____ Number of pages: _____

Maltec-T order / Quote number: _____

Model number: _____

Enclosure type:

- Selected as Standard option in model structure
- Special requirement: _____

Enclosure entry:

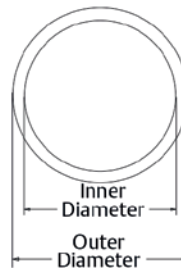
- Selected as Standard option in model structure
- Special requirement: _____

Thermowell material:

- Selected as Standard option in model structure
- Special requirement: DIN 1.4401 [ANSI 316]
 DIN 2.4816 [ASTM A494 (Alloy)]
 Other: _____

Thermowell diameter:

- Selected as Standard option in model structure
- Special requirement: Dimensions in millimeters
 Dimensions in inches
- Outer diameter: _____
- Inner diameter: _____



Mounting style:

- Selected as Standard option in model structure
- Special requirement: Flange rating: _____
 Flange material:
 DIN 1.4401 [ANSI 316]
 DIN 2.4816 [ASTM A494 (Alloy)]
 Other: _____

Maltec-T AIS Sensors

Page two

Measurement point distribution:

- Selected as Standard option in model structure
- Special requirement (fill in table below)

Tagging:

- Default
- Special requirement (fill in table below)- use with option code C1.

Point	Distance from mounting point	Point tag	Transmitter tag	Transmitter range
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				



Maltec-T AIS Sensors

Maltec-T MT8000-2R RTD Multipoint Sensor— Contacting Fixture Design

The Maltec-T MT8000-2R Multipoint Sensor offers durability and a long lifespan. Featuring individual resistance elements, typically a 4-wire RTD, it supports up to 12 measurement points for applications not demanding high local resolution. Available with or without thermowells, it is ideal for various setups.

For data acquisition requiring an RTD output signal, the MT8000-2R is optimal. However, for transmitter-based systems needing higher temperature ranges or more measurement points, consider a thermocouple sensor like the Maltec-T MT8000F. The MT8000-2R provides two fixation methods: Radial Spring and Spacer Design.

Radial spring design

This configuration ensures excellent thermal contact between the RTD and the thermowell. A radial spring applies pressure to the RTD element against the inner wall of the thermowell, guaranteeing optimal response time (refer to Figure 6). If ordered without a thermowell, it will be shipped as a coil. Individual RTD elements are not replaceable.

Spacer design

This design (refer to Figure 6) utilizes spacer disks for aligning the resistance elements. The individual RTD elements are fixed and cannot be replaced. The spacer configuration, with or without a thermowell, cannot be coiled for shipping.

Thermowell

Every Maltec-T MT8000-2R requires a thermowell for proper operation. If the Maltec-T MT8000-2R is ordered without a thermowell, check the inner diameter of the existing thermowell (refer to Table 10). The inner surface of the thermowell must be smooth, particularly at the weld joints, to prevent any damage to the multipoint sensor during insertion.

Specifications

Functional

Number of measurement points
2 to 12

Temperature limits

-40 to 450 °C (-40 to 842 °F)

Physical

Physical dimensions

Table 10. Thermowell Required Diameters for the Radial Spring and Spacer Design

Number of Measurement point	O.D.		I.D.	
	mm	inch	mm	inch
2 to 8	73	2.9	59	2.3
9 to 12	88.9	3.5	73.7	2.9

Length limits

10 m (33 ft) with thermowell
30 m (99 ft) without thermowell— Radial Spring design only

Performance

Ambient temperature limits

For the enclosures and transmitters is -40 to 80 °C (-40 to 176 °F)

Insulation resistance

Greater than 1000 MOhms at room temperature, test voltage is 500 VDC

Accuracy

Table 11. Accuracy in Accordance to DIN EN 60751

Class	
A	$\pm(0.15K+0.0020 * t)$
B	$\pm(0.30K+0.0050 * t)$
"t" is the temperature in °C.	

Enclosures

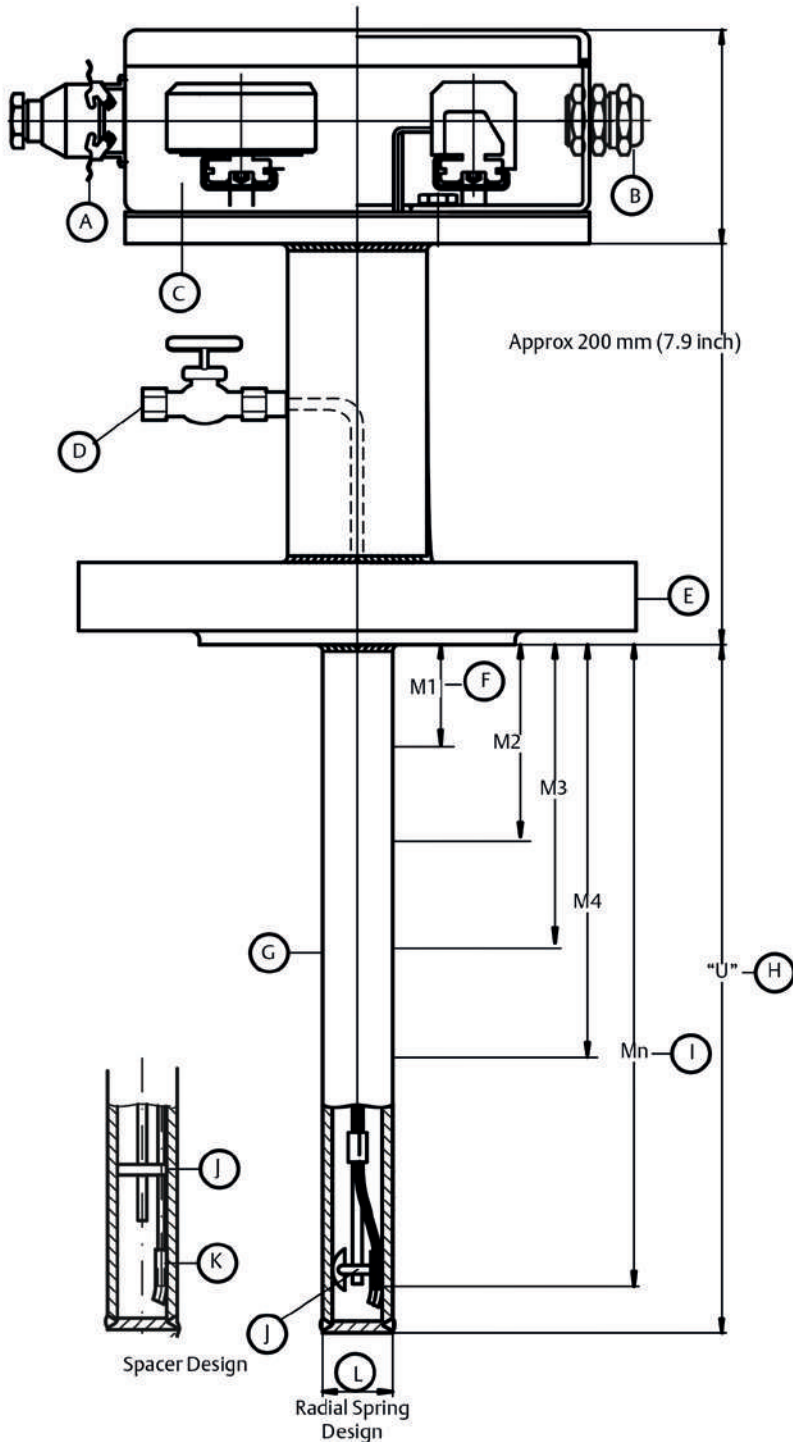
The enclosures are described in "Enclosures with mounting hardware" on page 29.

Individual sensor identification data

By default, sensor 1 is closest to the flange. Remaining points are numbered incrementally. Use the C1 option and the CDS if a different numbering system is desired.

Maltec-T AIS Sensors

Figure 6. Multipoint Sensor Maltec-T MT8000-2R, Radial Spring and Spacer Design (Pt 100 RTD)



- | | |
|---|--|
| <ul style="list-style-type: none"> A. Enclosure entry (Han-Plug connection) B. Enclosure entry (Cable glands) C. Enclosure type (see "Enclosures with mounting hardware" on page 29) D. Leak check valve (optional) E. Mounting style F. First measurement point location | <ul style="list-style-type: none"> G. Thermowell material H. Immersion length "U" I. Number of measurement points J. Element fixation method K. Pt100 RTD L. Thermowell outside diameter |
|---|--|

Maltec-T AIS Sensors

Ordering information

Table 12. Maltec-T MT8000-2R Ordering information

Model	Product description			
MT8000-2R	Maltec-T MT8000-2R RTD Multipoint Profiling Sensor–Contacting Fixture Design			
Code	Element fixation method			
1	Radial springs design			
2	Spacer design			
Code	Sensor type	Operating temperature range		
		°C	°F	
A	Pt100 Class A	-40 to 450	-40 to 842	
B	Pt100, Class B	-40 to 450	-40 to 842	
Code	Number of measurement points			
05	5			
08	8			
12	12			
XX	Other quantities (minimum. 02; maximum. 12)			
Code	Transmitter mounting hardware ⁽¹⁾		Maximum measuring points	
A	With mounting hardware		12	
N	With no transmitter hardware; terminal strips only		12	
Code	Enclosure type ⁽¹⁾	Material	IP rating	NEMA rating
A	EEx d CENELEC Flameproof Approved (consult factory for availability)	Aluminum	65	NEMA 4
B	EEx e CENELEC Increased Safety Approval (consult factory for availability)	Aluminum	65	NEMA 4
C	EEx i Intrinsically Safety acc. EN 50014 and EN 50020 with manufacturer declaration for Ex i use in Zone 1	Aluminum	65	NEMA 4
D	Standard aluminum	Aluminum	65	NEMA 4
E	Standard polyester	Polyester	65	NEMA 4
S	Special enclosure type (Configuration Data Sheet required)			
Code	Enclosure entry			
1	Single multi-core cable gland			
2	Multiple cable glands M20 x 1.5 (one per measurement point)			
3	Han-Plug connection IP65			
4	Customer specified–consult factory (Configuration Data Sheet required)			

Maltec-T AIS Sensors

Table 12. Maltec-T MT8000-2R Ordering Table

Code	Thermowell material	Maximum temperature	
		°C	°F
D	Stainless steel - DIN 1.4404 (ANSI 316L)	450	842
P	Heat resistant steel–DIN 1.7380 (ANSI 182-F22)	750	1382
S	Special tube material - customer specified (Configuration Data Sheet required)	Consult factory	
N	No thermowell		
Code	Thermowell diameter		
A	Standard (see Table 10)		
C	Customer specified (Configuration Data Sheet required)		
Code	Immersion length “U”		
01000	1000 mm (39 inch)	Note: Length code is in mm. To convert to mm multiply the length in inches by 25.4.	
02000	2000 mm (79 inch)		
03000	3000 mm (118 inch)		
05000	5000 mm (197 inch)		
07000	7000 mm (276 inch)		
10000	10000 mm (394 inch)		
XXXXX	Other lengths maximum 10000mm (394 in) with thermowell) (maximum 30000 without thermowell–radial spring design only)		
Code	Measurement point distribution		
A	Equally distributed points (last point placed approx 50 mm from the bottom of the thermowell)		
C	Customer specified (Configuration Data Sheet required)		
Code	First measurement point location–distance from base of mounting flange		
00500	500 mm (20 inch)		
01000	1000 mm (39 inch)		
02000	2000 mm (79 inch)		
03000	3000 mm (118 inch)		
04000	4000 mm (158 inch)		
XXXXX	Other lengths		
Code	Mounting style–flange material= DIN 1.4404 (ANSI 316L)	Process connection	
F36	Flanged, ANSI	2-in. Class 300 RF	
F74	Flanged, ANSI	2½-in. Class 300 RF	
F76	Flanged, ANSI	3-in. Class 300 RF	
F54	Flanged, ANSI	2-in. Class 600 RF	
F78	Flanged, ANSI	2½-in. Class 600 RF	
F80	Flanged, ANSI	3-in. Class 600 RF	
F72	Flanged, ANSI	2-in. Class 900 RF	

Maltec-T AIS Sensors

Table 12. Maltec-T MT8000-2R Ordering Table

F82	Flanged, ANSI	2 1/2-in. Class 900 RF
F84	Flanged, ANSI	3-in. Class 900 RF
D26	Flanged, DIN	DN 50 PN 25/40
CDS	Customer specified (Configuration Data Sheet required)	
Code	Additional options	
	Special tagging and configuration options	
C1 ⁽²⁾	Customer specified tagging (Configuration Data Sheet required)	
	Thermowell options	
Q8	Thermowell material certification, DIN EN 10204 3.1.B	
R01	Thermowell pressure testing	
R03	Thermowell dye penetration testing	
R07	Full penetration weld	
R16	Ring joint flange (ASME B16.5 ANSI flanged thermowells only)	
	Process connection options	
P01	Leak check valve	
Typical model number: MT8000-2R 1 A 08 A D 1 D A 01000 A 00500 F36 R01		

1. Transmitter must be ordered separately.
2. Shipped with default numbered tagging of all measurement points. The first measurement point (closest to the enclosure) is tag "1." If other configuration is required, order option code C1.

Maltec-T AIS Sensors

Maltec-T MT8000-2R Configuration Data Sheet (CDS)

Page one

Copy this form, complete it as required, and fax it to the appropriate fax number listed on the next page

Customer name: _____

Address: _____

Contact person: _____

Phone: _____ Fax: _____

Date: _____ Number of pages: _____

Maltec-T order / Quote number: _____

Model number: _____

Enclosure type:

- Selected as Standard option in model structure
- Special requirement: _____

Enclosure entry:

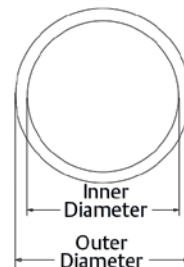
- Selected as Standard option in model structure
- Special requirement: _____

Thermowell material:

- Selected as Standard option in model structure
- Special requirement: DIN 1.4401 [ANSI 316]
 DIN 2.4816 [ASTM A494 (Alloy)]
 Other: _____

Thermowell diameter:

- Selected as Standard option in model structure
- Special requirement: Dimensions in millimeters
 Dimensions in inches
Outer diameter: _____
Inner diameter: _____



Maltec-T AIS Sensors

Mounting style:

- Selected as Standard option in model structure
- Special requirement:
 - Flange rating: _____
 - Flange material:
 - DIN 1.4401 [ANSI 316]
 - DIN 2.4816 [ASTM A494 (Alloy)]
 - Other: _____

Page two

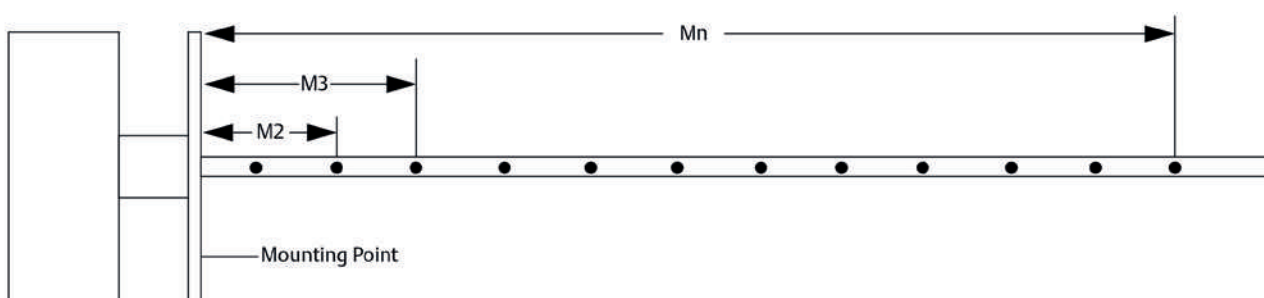
Measurement point distribution:

- Selected as Standard option in model structure
- Special requirement (fill in table below)

Tagging:

- Default
- Special requirement (fill in table below)– use with option code C1.

Point	Distance from mounting point	Point tag	Transmitter tag	Transmitter range
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				



Maltec-T AIS Sensors

Design Overview

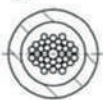
Compact design

The Compact Multipoint Sensor design comes in diameters ranging from 2.5mm (0.1 in.) to 40mm (1.6 in.). This design can monitor up to 60 measuring points using small diameter thermocouples within a single sheath. With its high number of measurement points, it enables precise temperature profile monitoring with excellent local resolution. This makes it an ideal solution for detecting hot spots in tall reactors or distillation columns. The compact design offers two protection options: bundled or insert tube. Insert tubes securely position the sensing elements and provide mechanical stability to the sensor, although they offer limited protection against the process medium.

Table 13. Available Insert Tube Outer Diameters

Diameter		Maximum measurement points
mm	inch	
3.5	0.14	25
4.5	0.18	30
5.0	0.20	40
6.0	0.24	60
8.0	0.32	60

Figure 7. Compact Design

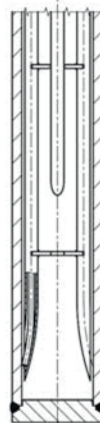


Guiding tube design

Dpstar's Guide Tube Multipoint design offers options for grounded or ungrounded thermocouples, suitable for pipes with a diameter of 1 inch or more. It accommodates between two and eight thermocouple sensors, ensuring optimal temperature response with a slight bend at the tip of each element. RTD elements are not compatible due to physical constraints.

Dpstar provides two methods of mounting the elements: sealed or unsealed, with spring loaded fittings for fast response time or compression fittings for environmental sealing. However, the protection tube size limits the number of measuring points, making it ideal for profiling applications where lower local resolution is acceptable and high process availability is crucial.

Figure 8. Guiding Tube Design



Maltec-T AIS Sensors

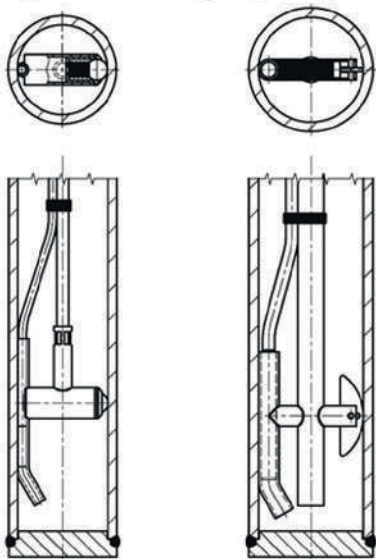
Radial spring design

The Radial Spring Multipoint design is available for diameters of 26 mm and above. This design incorporates between two and twenty flattened mineral insulated grounded or ungrounded thermocouples or RTD elements, which are pressed against the inner wall of the protection tube by radial springs. This ensures enhanced thermal contact with the process and achieves optimal response time.

The spring-loaded brace's design, featuring an angled blade and sliding head, compensates for tube wall thickness and easily navigates obstacles during assembly. The head of the spring-loaded brace comes in two versions: one with a ball at the end for inner protective diameters smaller than 30mm (1.18 in.), limited to a maximum length of 3m (9.8 ft.) and another utilizing a semicircular metal plate, suitable for applications with ample space.

Neither version of the Radial Spring Multipoint design permits the individual thermocouples to be replaced, but the entire sensor assembly can be replaced as one unit. This sensor design can be supplied as a coil with a maximum length of 30 m (98.4ft.) if no protection tube is required. However, if a protection tube is necessary and prevents coiling for shipping, the maximum length is restricted to 10 m (32.8 ft.).

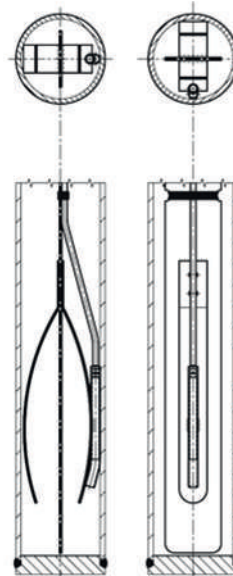
Figure 9. Radial Spring Design



Laminated spring design

The Laminated Spring Multipoint configuration accommodates up to 10 measuring points and is offered in diameters of 40 mm (1.58 in.) and larger. Through the pressure exerted by the laminated spring, the thermocouple maintains close contact with the inner wall of the protection tube, ensuring efficient thermal conductivity and swift response times. Notably, this design boasts a flexible support structure akin to an oil dipstick, allowing it to adapt to the contours of the protection tube, even when the mounting flange is angled. Moreover, it is suitable for applications with high refractory wrapage. While individual thermocouples cannot be replaced within this setup, the entire sensor assembly can be swapped out as a single unit. Optionally, this sensor configuration can be provided in coil form, with a maximum length of 30 m (98.4 ft.) if a protection tube is unnecessary. However, if a protection tube is needed and prevents coiling for shipping, the maximum length is limited to 10 m (32.8 ft.).

Figure 10. Laminated Spring Design



Maltec-T AIS Sensors

Spacer design

The Spacer Multipoint design is available for diameters of 18 mm (0.7 in.) and larger, providing an ideal solution for diameters where the laminated and radial spring design is not applicable. This design employs spacer disks to guide and secure the tips of up to 10 measuring point elements in place. The individual elements are permanently affixed to the spacer disk and are non-replaceable. Primarily utilized in applications where response time is not a critical factor or where the dimensions of the protection tube prevents the use of a different design.

Figure 11. Spacer Design



Freely bendable design

The flexible multipoint design incorporates multiple MI-Cable thermocouple or RTD sensors, either inserted directly into the process or housed within a compact multipoint sensor configuration within an annealed protection tube. Each MI cable allows for 3-Dimensional temperature measurements at high pressures with just one process penetration, enabling the individual elements to be positioned anywhere inside the reactor or vessel as needed. Once passed through the process penetration, the sensors can be arranged into the desired 3-Dimensional array by simply bending the MI cable. This eliminates the necessity for multiple horizontal or vertical straight-run multipoint sensors to achieve the same outcome. However, this design is limited by its pressure ratings.

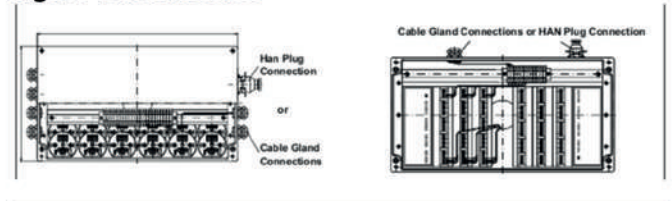
Other designs

Dpstar offers various other designs that are specifically designed to customer applications. Contact Dpstar's representative for more information.

Enclosures with mounting hardware

The illustrations in Figure 12 exhibit various junction boxes featuring different transmitter types and plugs. Transmitters must be ordered separately. The dimensions of the junction box are determined by the quantity and type of transmitters or terminal strips utilized.

Figure 12. Enclosures



Protection tube

Most multipoint designs require protection tubes, serving as a protective barrier between the measuring element and the process. The ideal size varies depending on the specific multipoint design, the number of measuring points and the process conditions. Selecting the appropriate material and wall thickness is paramount and must be based on factors such as process pressure, temperature and medium. Opting for the wrong material and dimensions can significantly diminish sensor lifespan and result in premature failures. Protection tubes can either be pre-installed or supplied by Dpstar based on application specifications.

Maltec-T AIS Sensors

Model examples

Figure 13. Radial Spring Multipoint Design

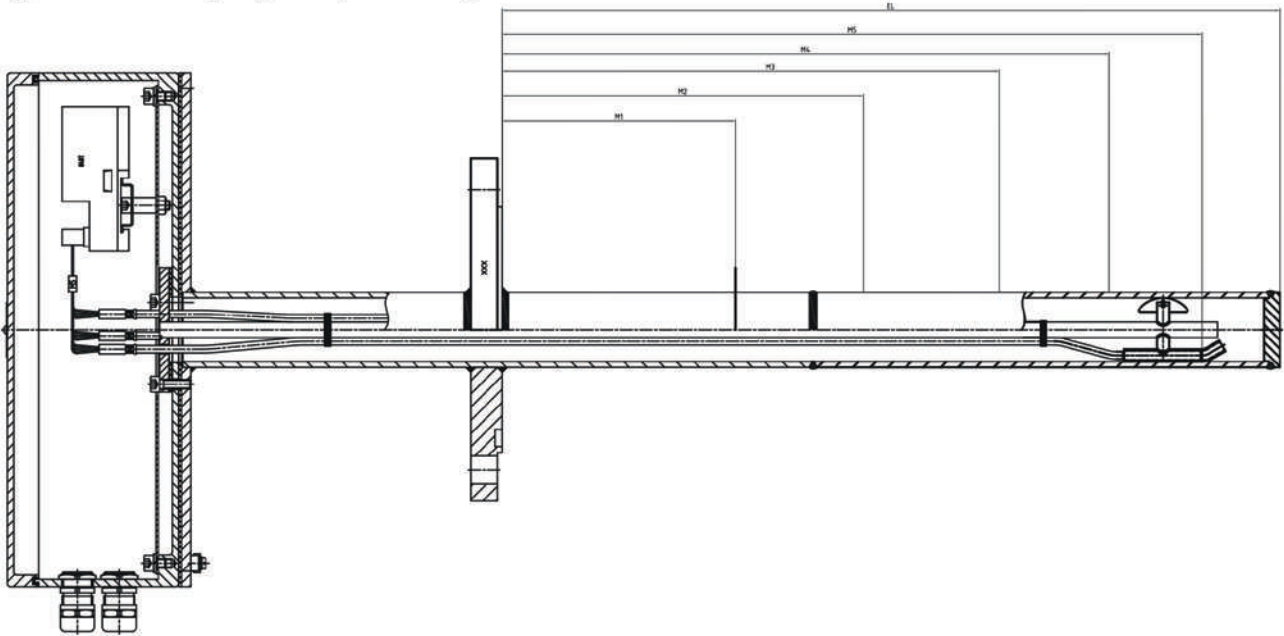
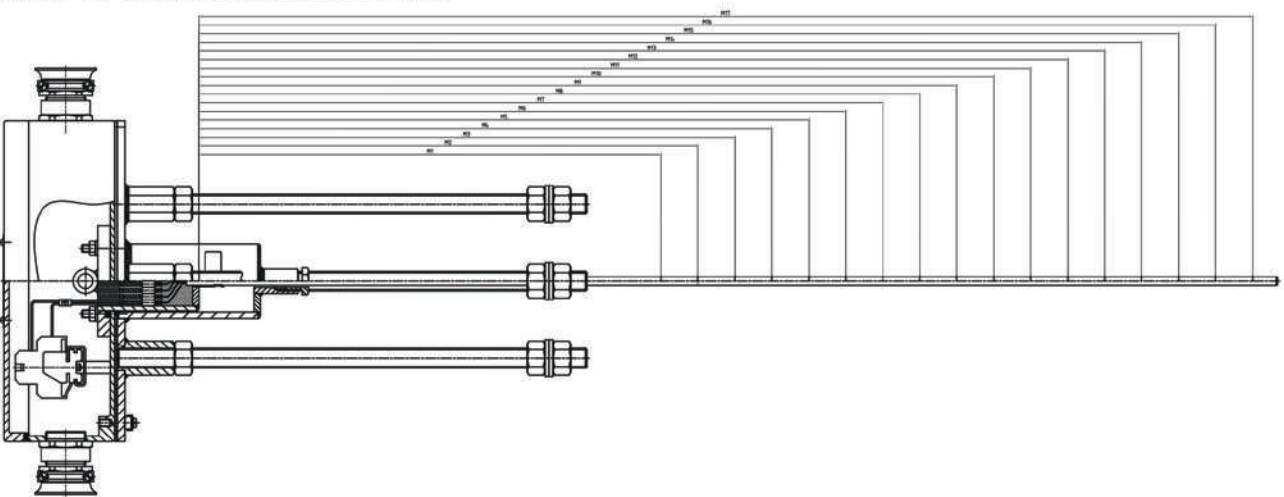


Figure 14. Compact Multipoint Design



Maltec-T AIS Sensors

Figure 15. Laminated Spring Multipoint Design

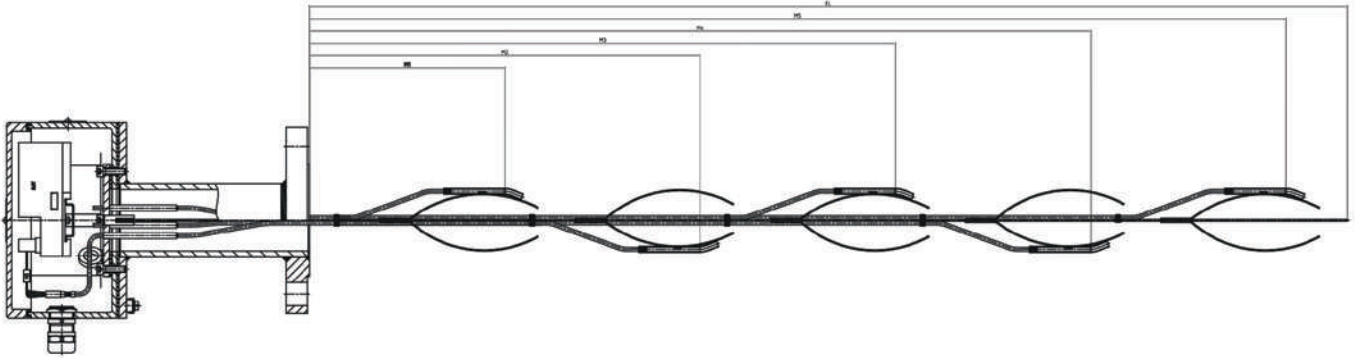


Figure 16. Spacer Multipoint Design

