Microcor® Probes

Model M4700 and M4500 Probes

Microcor® Probes are an integral component of the new high-resolution Microcor® system, including the Microcor Wireless Transmitter. Special design of the probes provides advanced thermal performance, and reliable operation in all environments including sour service. Two forms of probe element are available – flush and cylindrical. Several mounting configurations are available, the most common of which allow the probes to be inserted and removed under full process operating conditions without shutdown.

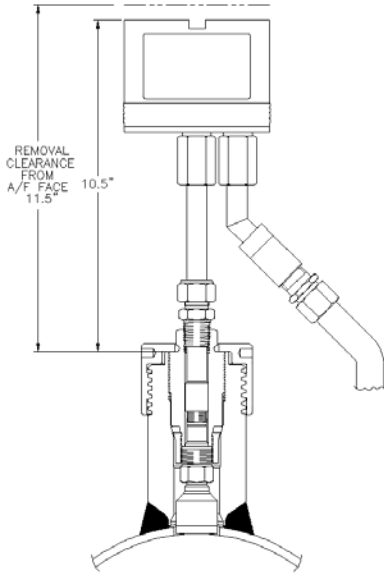
M4000 Series Probes
The M4000 series probes are called ***retrievable*** probes and are designed for use in the COSASCO® high pressure access fitting range. This permits probes to be removed or replaced at process conditions up to 6000 psi (400 bar), and temperatures up to 400°F (204°C) with the COSASCO® Retriever and service valve. Note: All 4000 series probes must be installed with an overshot adaptor (P/N 126292) to maintain connector cleanliness (see note on back page for details).

M3000 Series Probes
The M3000 series probes are called ***retractable*** probes that can be removed or replaced under full system operating conditions, up to 1500 psi (100 bar) and 500°F (260°C). With high temperature versions this may be extended to 1000°F (520°C) at pressures up to 1000 psi (67 bar). This series uses a sliding stuffing box seal.

M2000 Series Probes
The M2000 series probes are fixed probes that are used in high pressure, or especially hazardous process streams. However, they cannot be removed or replaced without system shutdown, unless installed in a bypass loop.

The Microcor® MT-9485A transmitter and Microcor Wireless Transmitter have to be closely coupled to the probe. This is achieved with a short connecting adapter, so that the transmitter is essentially mounted on the end of the probe. This is the recommended configuration. If conditions prevent this then a short cable of no more than 6 ft (2 meters) is available.

The Microcor® technology measures the metal loss that is occurring on the probe element with very high resolution. Consequently, it is useable in virtually any environment, as distinct from electrochemical methods which may only be used in essentially aqueous environments. From the collection of these metal loss readings over time, the corrosion rate can be computed. The very high resolution of the metal loss measurements enable the corrosion rate to be determined in minutes or hours, and provide rapid feedback on changes of corrosion rates, 50 to 100 times faster than other metal loss methods.



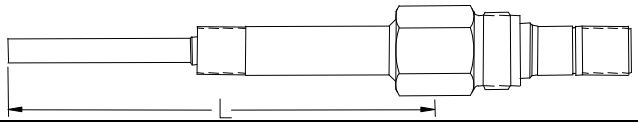
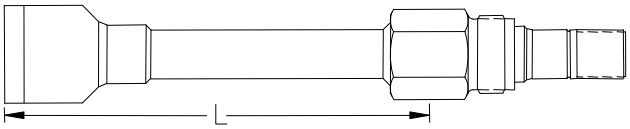
M4700 Probe in COSASCO® Fitting

The high resolution and sensitivity means that you can now obtain rapid response and a long probe life with the standard F10 and T10 probe elements. However, if necessary, other probe element thicknesses are available. The thinner the element, the faster is the response. The thicker the element, the longer is the probe life.

Flush Probes are used for best thermal performance where flush mounting with the pipe wall is desirable or essential. A typical example is the bottom-of-line locations in oil and gas production pipelines. In these applications, water films commonly collect in the bottom of the line and are the primary cause of corrosion. The flush probe ensures the whole of the probe element is exposed to the water film, whereas a cylindrical probe would only be partially exposed. In other pipeline applications flush probes are essential if the line is pigged, thereby avoiding possibility of probe damage.

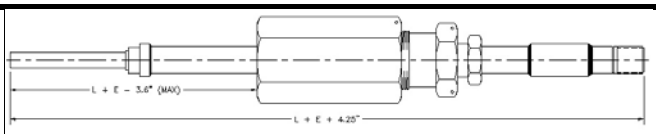
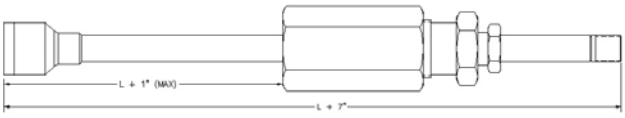
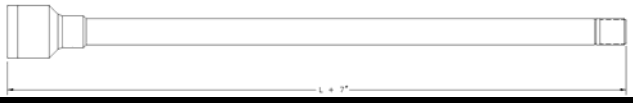
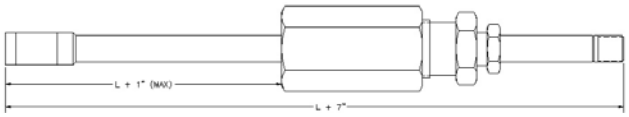
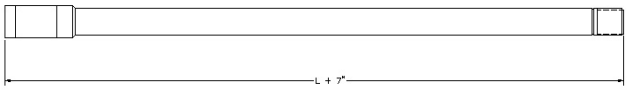
Cylindrical Probes are suited to more aggressive environments. Since there is no sealing material other than the parent metal, they are suitable for virtually any aggressive environment. The measurement area of the element is much greater in this design and is suitable for use in a single phase flow. In multiphase or stratified flows care must be taken to position the whole probe element in the corrosive phase to be monitored.

M4000 Series Retrievable Probes - Mounts in COSASCO® High Pressure Access Fitting, maximum operation 6000 psi (413 bar) and 500°F (260°C), maximum retrieval 400°F (204°C)

§ M4500		0.25” Length Increments Optional Shields available
§M4700		0.125” Length Increments

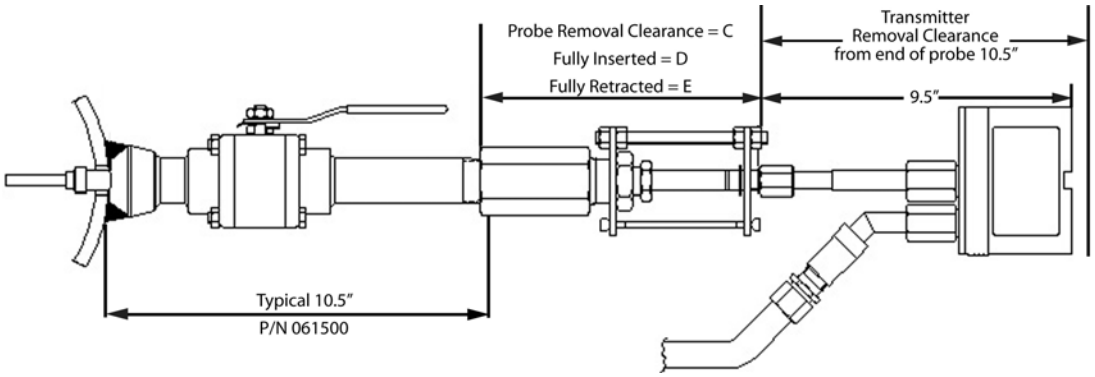
§ Most popular configurations

M3000 Series Retractable Probes – Mounts in Model 60 Access Valve 1” or 1.5” Assembly, Standard Probe Lengths 18”, 24”, 30”, & 36”. Safety Clamp Assembly required for pressures over 100 psi and/or temperatures over 150°F

§ M3500/3500HT		Optional Shields and Safety Clamps Requires 1” full port ball valve HT = High Temperature
M3501/3501HT		Replacement insert for M3500 HT = High Temperature
§ M3700		1.25” Diameter Head Optional Safety Clamps Requires 1.5” ball or gate valve & 1” to 1.5” swaged nipple connection between valve & stuffing box.
M3701		Model 3700 replacement insert
M3705		0.75” Diameter Head Optional Safety Clamps Requires 1” fullport ball valve
M3706		Model 3705 replacement insert

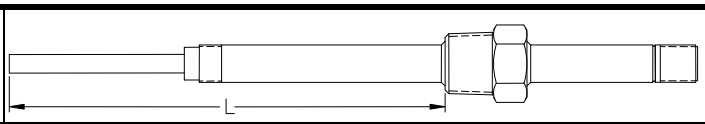
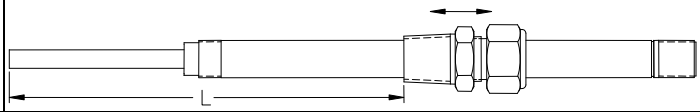
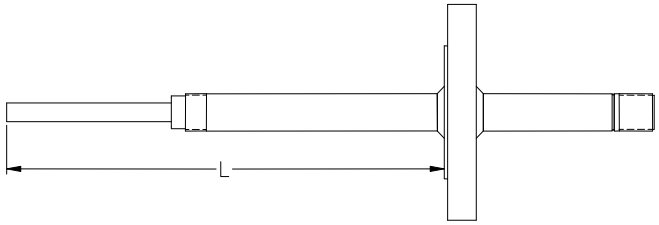
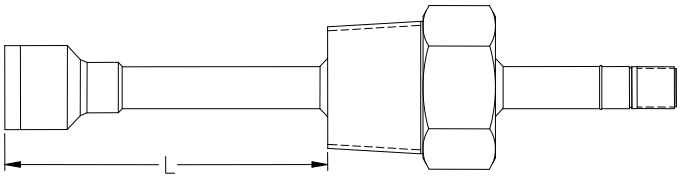
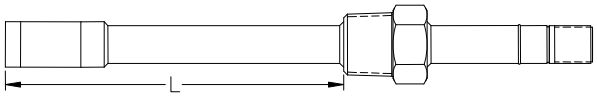
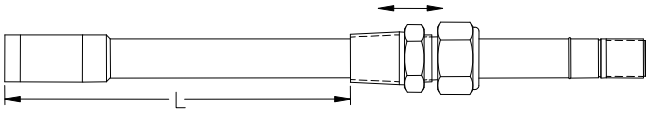
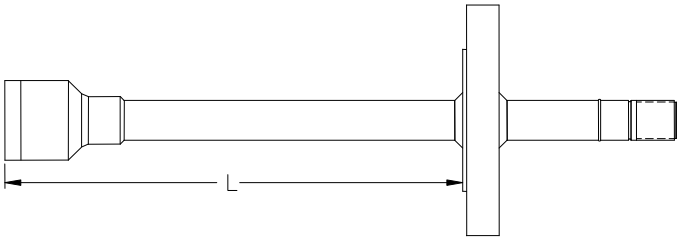
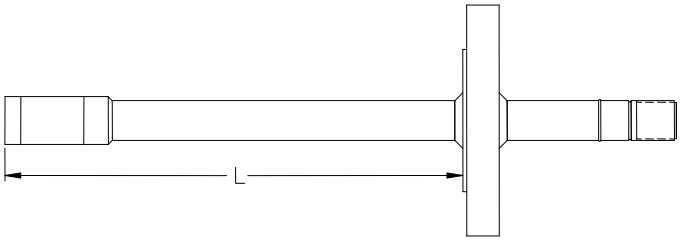
§ Most popular configurations

For dimensions A-E see Table (Field 4 – Order Length) under Ordering Information.



M3500 Probe in Retractable Model 60 Access Valve Assembly

M2000 Series Probes – Fixed. Maximum Pressures up to 4000 psi (276 bar) and 500°F (260°C)

M2500		0.75” Welded NPT Mounting Standard length 5”, specials in 0.25” increments. Optional Shields. Max 4000 psi (276 bar)
M2510		0.75” Swagelok® Adjustable Mounting Standard 5” length Optional Shields Max 500 psi (34 bar)
M2520		Flanged Mounting 1” minimum Optional Shields Max pressure - flange rating, to max 4000 psi (276 bar)
M2700		1.25” Diameter Head 1.50” Welded NPT Mounting, Standard 5” length, specials in 0.25” increments. Max 4000 psi (276 bar)
M2705		0.75” Diameter Head 0.75” Welded NPT Mounting Max 4000 psi (276 bar)
M2715		0.75” Diameter Head, 0.75” Swagelok® Adjustable Mounting Max 500 psi (34 bar)
M2720		1.25” Diameter Head Flanged Mounting 1.5” minimum Max pressure - flange rating, to max 4000 psi (276 bar)
M2725		0.75” Diameter Head Flanged Mounting 1” minimum Max pressure - flange rating, to max 4000 psi (276 bar)

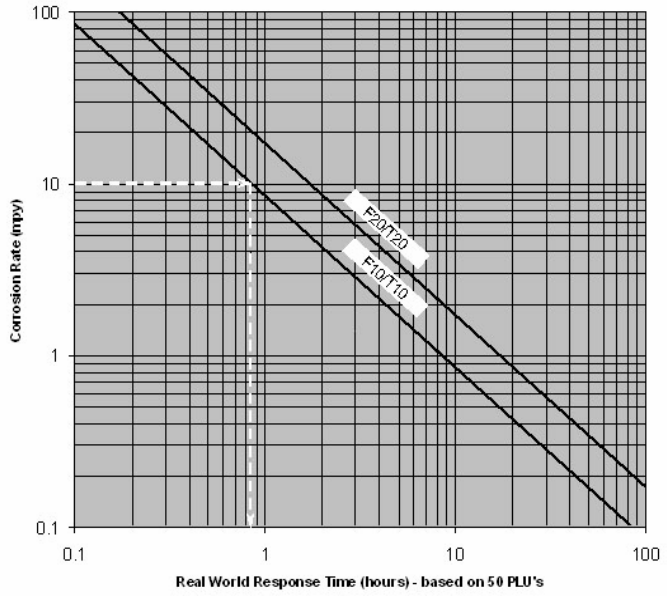
Ordering Information:

Probe Model Number Configuration							
	Field 1	**Field 2**	**Field 3**	**Field 4**	**Field 5**	**Field 6**	**Field 7**
Probe Model	Model #	Element Type	Element Alloy	Order Length L			
M3500/3500HT	All Probes			18", 24", 30", 36" Nominal	Safety Clamp	Element Shield	Stuffing Box
M3501/3501HT							
M3700					Safety Clamp		
M3701							
M3705					Safety Clamp		
M3706							
M4500				1/4" Increments	Element Shield		
M4700				1/8" Increments			
M2000 Series				Specify Process Side, Probe Length, Mounting Type, Shield Requirements			

Field 2 - Element Type – see chart below	
Cylindrical Element Probes - (Models Mx500)	
T10	10 mils thickness (5 mils probe span)
T20	20 mils thickness (10 mils probe span)
Flush Element Probes - (Models Mx700, Mx701, Mx705, Mx706)	
F10	10 mils thickness (5 mils probe span)
F20	20 mils thickness (10 mils probe span)

Field 3 – Probe Element Alloy (UNS Number)	
K03005	Carbon Steel
S30403	304/304L Stainless Steel
S31603	316/316L Stainless Steel

NOTE: Many other alloy options are available. Contact RCS for price and availability.



Response time to corrosion upset conditions depends on the probe element thickness, the magnitude of the upset corrosion rate and the typical system noise. The adjacent graph shows the typical time required to detect the new corrosion rate trend over the background noise experienced in the real world environment. This is based on 50 Probe Life Units (PLU's) change of the 262,144 PLU's that correspond to the full probe span. 1 PLU is the resolution of the Microcor® transmitter. For example (see white lines), if there is a sudden change from 0 to 10 mpy in the corrosion rate, this will be detectable in approximately 0.85 hours, or 50 minutes.

$$\text{Probe Life (years)} = \frac{\text{Probe Span (mils)}}{\text{Average Corrosion Rate (mpy)}}$$

F10 and T10 probes are the most popular, as they provide a good combination of sensitivity and probe life.

Field 4 - Order Length = L							
L	**Model**	**Probe Length**					
L	M4500	2.75”(T10) or 4.5” (T20) to 18” in 0.25” Increments. Consult RCS over 15” and 25 ft/s liquid velocity				L = P + T + 1.25” rounded down, where, P = Penetration inside pipe or vessel T = Wall Thickness of pipe or vessel Formula is based on standard access fitting of 5.25” and 1/16” weld gap per ANSI B31.1	
L	M4700	1.25” to 18” in 0.125” Increments. Consult RCS over 15” and 25 ft/s liquid velocity					
L = 18 24 30 36	M3000 Series	M3500 Series				M3700/3705	
		DIM	T10	T20	T50	DIM	
		A	L – 1.35”	L+ 6.4”	L + 6.4”	A	L + 1”
		B	L + 6.5”	L + 8.25”	L + 14.25”	B	L + 7”
		C	L + 7.5”	L + 9.25”	L + 15.25”	C	L + 5”
		D	L – 10”			D	L – 12.63”
		E	L + 5”			E	L + 8”
L	M2000 Series	Probe tip to process side of mounting					

Model M3000 Series probes have probe locking ferrules on the top of the stuffing box that have been tested up to 3000 psi, twice the maximum rating of the probes. The design of the probes also provides a shoulder or a shield on the probe body that prevents the probe from passing through the stuffing box. However, for added safety above 150 psig or 150F process conditions, the additional safety clamp should be used. The safety clamp threaded rods provide a secondary lock to hold the probe in the inserted position. The included safety wire provides a guide to full retraction of the probe through the valve at the time of probe removal.

The stuffing box seal loading nut is provided with drilled holes and wire to allow locking of the nut to prevent loosening under heavy vibration conditions.

Field 5 - Safety Clamp	
Model M3000 Series Only	
0	None
1	Safety Clamp over 100 psi and/or 150F

Microcor® probes may be subject to high flow velocities in some processes. This is not a problem for the flush element (x700 series) probes, since the element is recessed in its mounting so that the front face of the element is flush with the pipe or vessel wall, and not subjected to any significant bending forces due to the flow or vibration due to flow vortex shedding patterns. However, cylindrical element (Mx500 series) probes are subject to these forces and must be protected at higher velocities as indicated in the table below. If the velocity is low enough, it is preferred to run the probe without a shield as it gives full exposure of the element to the process flow. When a standard shield is used, it includes a probe tip support that provides protection from fatigue of the probe element at its base caused by flow vortex shedding. It also provides protection from the additional bending forces from the flow. For high velocity shield has holes only on the sides of the shield. The blank side should be positioned to face into the flow and protect the element from direct impingement or erosion, while the side holes still permit circulation around the probe element.

Field 5 or 6 - Shields	
Model Mx500 Only	
0	No Shield - Liquids up to 8ft/s, Gases 25ft/s
1	Standard Shield – liquids up to 25ft/s, Gases 75ft/s
2	High Velocity Shield – Liquids up to 50ft/s, Gases 150ft/s

NOTE: These shield recommendations are based on the exposure of the probe element. For liquid flows over 50 ft/s or gas flows over 75 ft/s, where the probe protrudes into the pipe or vessel more than 12" on model M3000 series probes, or 15" on other models contact RCS with details to check suitability for service.

Field 7 - Stuffing Box Material *		
Model M3000 Series Only		
0	M3500	Carbon Steel for cs, 316 ss, for alloys up to ss. For higher alloys use option 1 Hastelloy C-276
	M3500HT	316 ss for alloys up to ss. For higher alloys use option 1, Hastelloy C-276
1		Hastelloy C-276 Stuffing Box

*Probe body alloy matches probe element alloy, except for carbon steel in M3500HT where probe body is stainless steel.

How to Order:

Order Model # Field 1 – Field 2 – Field 3 – Field 4 – Field 5 – Field 6 – Field 7

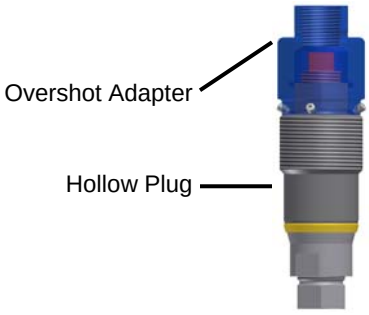
Example: M3500 – T10 – K03005 – 18 – 1 – 1 - 0

Model # M3500 with T10-K03005 element, 18" length, with safety clamp, standard element shield, stuffing box carbon steel

Note:

Model 4000 Series Probe Connection During Installation
Microcor probe connectors must be kept clean for proper operation. To ensure this on Model 4000 series probe an Overshot Adaptor should be fitted to the hollow plug during probe installation and retrieval. This seals the area of the probe connector from the process fluid during installation and retrieval.

Overshot Adapter: P/N 126292



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ISO 9001:2008
Certificate No. FM 10694

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