

# Roxar Electrical Resistance (ER) Probes

## 1" Retractable System



### High Accuracy Retractable ER probes

Corrosion is a serious industry problem, and corrosion control is important in order to avoid damage and loss of integrity in a plant or production site. Efficient corrosion mitigation requires fast and reliable tools for control and verification of protection programs, such as the use of corrosion inhibitors.

Electrical Resistance (ER) probes are probably the most commonly used technology used for internal corrosion monitoring. ER probes provide a very high resolution and sensitivity compared to other technologies available, and changes in corrosion rates can be identified within hours or days <sup>1)</sup>.

ER probes measure corrosion and corrosion rates as an increase in electrical resistance over time for a steel element in the probe face. The increase in electrical resistance is proportional to the accumulated corrosion of the probe element over the exposure period. Since resistance is also dependent on temperature, a reference element (not exposed to corrosion) is embedded inside the probe body for temperature correction.

ER probes can generally be used in most common environments, like oil, gas and water. The ER probes described in this data sheet are of the retractable type, mostly used for applications with moderate pressure, however, at times with high temperature requirements.

A retractable ER probe assembly comprises the following:

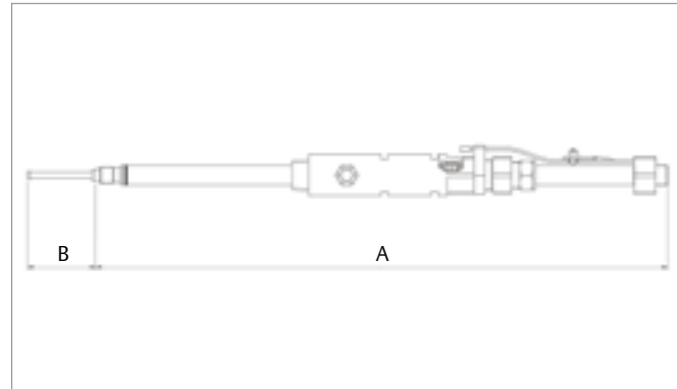
- Retractable ER probe
- Pipe connection through a threadolet or flanged connection
- Minimum 1" full port valve (optional, often provided by client)
- Packing box
- Safety wire arrangement

Safety and operational reliability are important elements of the probe design. In addition to the safety wire, the probe also contains a blow out preventor to ensure that the probe is not accidentally pushed out from its position when installed.

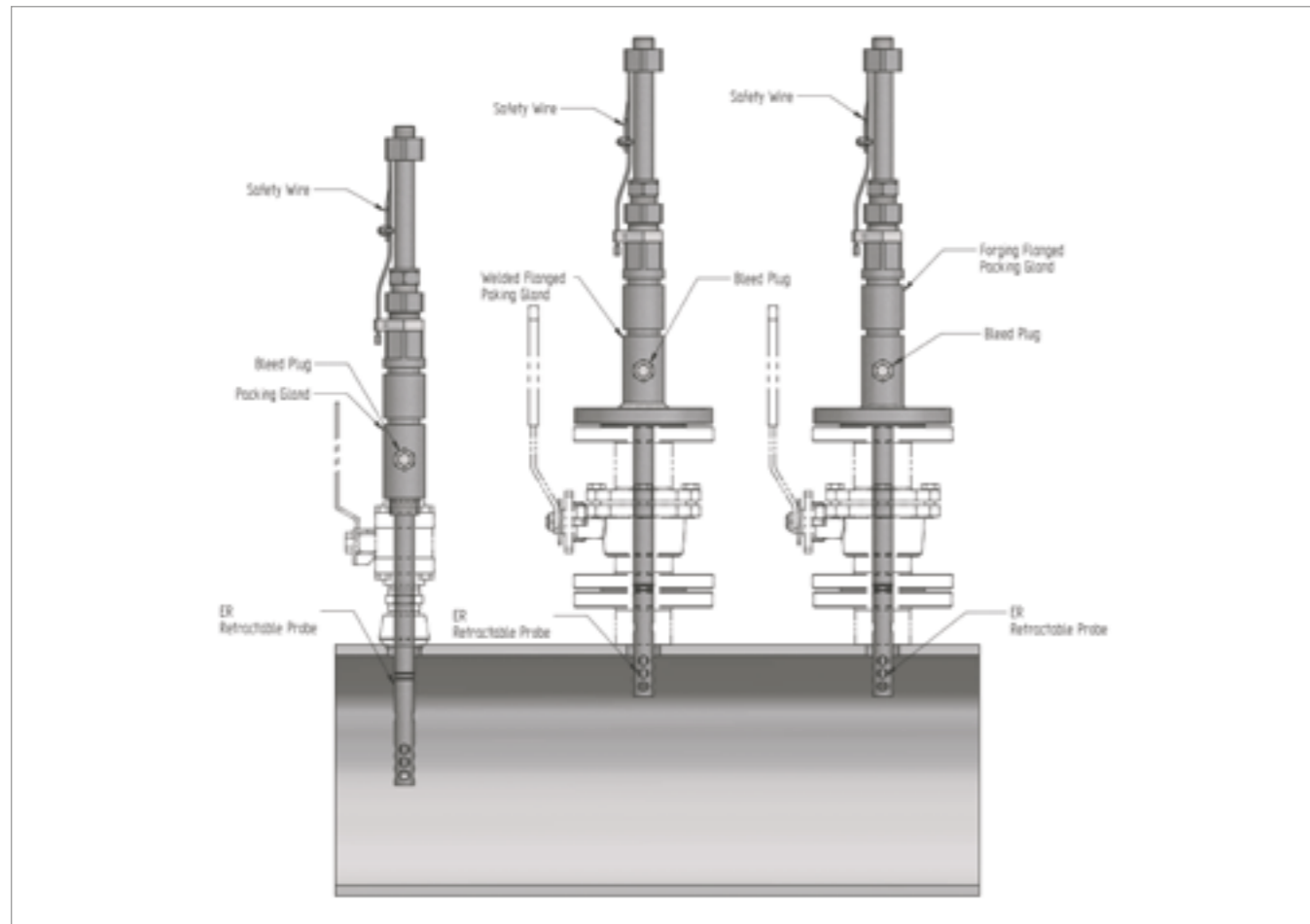
In order to ensure controlled installation and retrieval of probes and coupons, it is recommended that Roxar's Retractor Tool is always used.

Quality of information and measurement accuracy depends on measurement frequency and instruments used. For best results, it is recommended that Roxar Retractable ER probes are used with Roxar CorrLog or Roxar CorrLog Wireless high accuracy instruments, covering a wide range of configuration options.

<sup>1)</sup> Depending on probe type, measurement frequency and corrosion rates



Retractable probe 1"					
Order length	A Dimension		B Dimension		
	Inches	mm	T10	T20	T40
18	18.7	475	75	127	147
24	24.7	628			
30	30.7	780			
36	36.7	933			



Typical installation arrangement for retractable ER probes. Hatched parts are standard deliveries from Roxar.

### General Specifications

Item	Description
Mounting:	1" Full Port Valve (minimum)
Rating:	1500 psi and 450 °C /842 °F

### ER probe resolution, sensitivity and response time

Resolution and sensitivity of an ER probe depend on many factors, such as quality of instrument, data processing, measurement frequency, environmental conditions and probe design.

When used with Emerson Roxar CorrLog and CorrLog Wireless instruments, resolution of instrument is 24 bit, corresponding to 0,06 ppm of element thickness.

However, real life sensitivity will be different from instrument resolution due to factors mentioned above, and Emerson Roxar normally states that experienced sensitivity range from 10 to 100 ppm of the probe element thickness. Corresponding response time is the time it will take to see a metal loss larger than the sensitivity of the probe at a given corrosion rate.

For the Roxar range of retractable probes, the table below reflects sensitivity and response times for various corrosion rates<sup>1)</sup>.

Probe Model	T10		T20		T40	
Element in mils	<b>10</b>		<b>20</b>		<b>40</b>	
Element in micrometer	254		508		1016	
Sensitivity/Accuracy (ppm)	10	100	10	100	10	100
Sensitivity/Accuracy (nm)	2.54	25.4	5.08	50.8	10.16	101.6
1MPY corrosion rate = 2.9 nm/Hr	2.90					
5MPY corrosion rate = 14.5 nm/Hr	14.50					
10MPY corrosion rate = 29 nm/Hr	29.00					
20MPY corrosion rate = 57.99 nm/Hr	57.99					
Response time in Hrs. @ 1MPY	0.88	8.76	1.75	17.52	3.50	35.04
Response time in Hrs. @ 5MPY	0.18	1.75	0.35	3.50	0.70	7.01
Response time in Hrs. @ 10MPY	0.09	0.88	0.18	1.75	0.35	3.50
Response time in Hrs. @ 20MPY	0.04	0.44	0.09	0.88	0.18	1.75
Element allowed to be corroded	50%					
Probe life in Years, considering 50% corrosion of element @ 1MPY	5		10		20	
Probe life in Years, considering 50% corrosion of element @ 5MPY	1		2		4	
Probe life in Years, considering 50% corrosion of element @ 10MPY	0.5		1		2	
Probe life in Years, considering 50% corrosion of element @ 20MPY	0.25		0.5		1	

<sup>1</sup> 1 nm = 1/1000 mm | 1 mil = 1/1000 inch or 0.025 mm | 1 nM = 1/1000 nm or 1/1000000 mm

It may also be interesting to compare with NACE's definitions of corrosion levels:

Grade of Corrosion (NACE RP0775)	Corrosion Rate (mm/Yr)	Corrosion Rate MPY
Low	< 0.025	<1
Moderate	0.025 to 0.125	1 to 5
Severe	0.125 to 0.254	5 to 10
Very Severe	> 0.254	>10

## Model Code Selector - Retractable ER probe

Model	Product Description		
TLCMPR	Retractable Corrosion Monitoring Probe		
Code	Measuring Method		
01	Electrical Resistance		
Code	Probe Body Material		
2C6A	Stainless Steel A 479 Gr. 316L, bar	EN 10204 3.1 NACE MR0175	
2C6C	Stainless Steel A 479 Gr. 316L, bar	EN 10204 3.1 NACE MR0175	NORSOK M630 MDS S01
9X9X <sup>1</sup>	Project Specific Material		
Code	Element Type and Material		
10S	Tubular	T10 (0.25 mm)	Carbon Steel (St52-3N) UNS S355 J2+N
11S	Tubular	T20 (0.50 mm)	Carbon Steel (St52-3N) UNS S355 J2+N
12S	Tubular	T40 (1.00 mm)	Carbon Steel (St52-3N) UNS S355 J2+N
13S	Tubular	T10 (0.25 mm)	5%Cr UNS S 50200
14S	Tubular	T20 (0.50 mm)	5%Cr UNS S 50200
15S	Tubular	T40 (1.00 mm)	5%Cr UNS S 50200
16S	Tubular	T10 (0.25 mm)	9%Cr UNS S 50400
17S	Tubular	T20 (0.50 mm)	9%Cr UNS S 50400
18S	Tubular	T40 (1.00 mm)	9%Cr UNS S 50400
60S	Tubular	T10 (0.25 mm)	Stainless Steel UNS S 31603
61S	Tubular	T20 (0.50 mm)	Stainless Steel UNS S 31603
62S	Tubular	T40 (1.00 mm)	Stainless Steel UNS S 31603
999 <sup>1</sup>	Other Element Material and/or Type		
Code	Probe Length		
L0	18"		
L1	24"		
L2	30"		
L3	36"		
Code	Product Accessory		
A1	Velocity shield (incl. blow out preventer function, AISI 316L)		
A2	Blow out preventer (AISI 316L)		
Code	Factory Options		
Z	Standard product		

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X	ETO product
Code	Certificate, Tests, Calibrations and Services (Not Required, all are optional)
	Dye Penetrant Examination (select any from this group)
D1	Dye Penetrant Test
	Positive Material Testing (select only one from this group)
M1	Positive Material Identification
	Other testing
TX <sup>1</sup>	Project specific testing

<sup>1</sup> Not applicable for factory option Z

## Model Code Selector - Packing Box

Model	Product Description		
TPACK	Retractable System Packing Box (incl. Safety wire and bleed valve)		
Code	Pressure Rating		
1	Max 1 500 psi Design Pressure		
Code	Process Connection		
50	NPT Male		
60	Flanged 150 lbs RF	ASME B16.5	Socket Welding Flange
61	Flanged 300 lbs RF	ASME B16.5	Socket Welding Flange
62	Flanged 400/600 lbs RF	ASME B16.5	Socket Welding Flange
63	Flanged 400/600 lbs RTJ	ASME B16.5	Socket Welding Flange
70	Flanged 150 lbs RF	ASME B16.5	Integral Flange
71	Flanged 300 lbs RF	ASME B16.5	Integral Flange
72	Flanged 400/600 lbs RF	ASME B16.5	Integral Flange
73	Flanged 400/600 lbs RTJ	ASME B16.5	Integral Flange
99 <sup>11</sup>	Other Connection		
Code	Process Connection Size		
A	1"		
B	1,5"		
C	2"		
X <sup>11</sup>	Other		

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Code	Material Packing Box
0N0N <sup>1</sup>	Not applicable, same as Material Flange
0B6A <sup>2</sup>	Carbon Steel ASTM A350 Gr. LF2 Cl. 1, bar EN 10204 3.1 NACE MR0175
0B6C <sup>2</sup>	Carbon Steel ASTM A350 Gr. LF2 Cl. 1, bar EN 10204 3.1 NACE MR0175 NORSOK M630 MDS C11
2C6A <sup>2</sup>	Stainless Steel A 479 Gr. 316L, bar EN 10204 3.1 NACE MR0175
2C6C <sup>2</sup>	Stainless Steel A 479 Gr. 316L, bar EN 10204 3.1 NACE MR0175 NORSOK M630 MDS S01
9X9X <sup>11</sup>	Project Specific Material
Code	Material Flange
0N0N <sup>3</sup>	Not applicable
0B3A <sup>4,5</sup>	Carbon Steel ASTM A350 Gr. LF2 Cl. 1, forging EN 10204 3.1 NACE MR0175
0B3C <sup>4,6</sup>	Carbon Steel ASTM A350 Gr. LF2 Cl. 1, forging EN 10204 3.1 NACE MR0175 NORSOK M630 MDS C11
2C3A <sup>4,7</sup>	Stainless Steel A 182/182M Gr. 316L, forging EN 10204 3.1 NACE MR0175
2C3C <sup>4,8</sup>	Stainless Steel A 182/182M Gr. 316L, forging EN 10204 3.1 NACE MR0175 NORSOK M630 MDS S01
9X9X <sup>11</sup>	Project Specific Material
Code	Operating Mode and Conditions
S1	Standard Temperature (< 230 °C) PTFE 25% GF Main Seal
S2	High Temperature (>230 °C) Grafoil Main Seal
Code	Product Specific Options
C0	No Coating
C1 <sup>9</sup>	Roxar Standard Coating for CS with (surface temperature below 120 °C)
C2 <sup>9</sup>	Roxar Standard Coating for CS (surface temperature above 120 °C)
C6 <sup>10</sup>	Roxar Standard Coating for SS
CX <sup>11</sup>	Project Specific
Code	Tag Plates
Z	No Tag Plates
A	Standard Tag plates for fittings
Code	Factory Options
Z	Standard product
X	ETO product

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Code	Certificate, Tests, Calibrations and Services (Not Required, all are optional)
	Dye Penetrant Examination (select any from this group)
D1	Dye Penetrant Test
	Positive Material Testing (select only one from this group)
M1 <sup>10</sup>	Positive Material Identification
	Other testing
TX <sup>10</sup>	Project specific testing

<sup>1</sup> Only applicable for Process Connection option 70, 71, 72, 73<sup>2</sup> Not applicable for Process Connection option 70, 71, 72, 73<sup>3</sup> Only applicable for Process Connection option 50<sup>4</sup> Not available for Process Connection option 50<sup>5</sup> Only available for Material Packing Box option 0N0N and 0B6A<sup>6</sup> Only available for Material Packing Box option 0N0N and 0B6C<sup>7</sup> Only available for Material Packing Box option 0N0N and 2C6A<sup>8</sup> Only available for Material Packing Box option 0N0N and 2C6C<sup>9</sup> Only available for Material Packing Box option 0B6A, 0B6C and Material Flange 0B3A, 0B3C<sup>10</sup> Only available for Material Packing Box option 2C6A, 2C6C and Material Flange 2C3A, 2C3C<sup>11</sup> Not available with Factory Option Z

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