Pyxis

DATASHEET

CR-301

High Temperature/Pressure LPR Corrosion Rate Sensor

LPR Corrosion Sensors -vs- Corrosion Coupons

The use of the LPR corrosion rate represents a valuable tool that can be easily and affordably deployed to provide both general and localized corrosion measurements in an instantaneous format. There is a common industrial misnomer that the use of inline LPR corrosion sensors should be identical to that of corrosion coupons. The LPR corrosion level represents the real-time electrochemical measurement of corrosion. While it may be linear with respect to the corrosion rate obtained from the weight loss of a coupon exposed to water for a long period, the LPR corrosion rate may not necessarily be the same exact value of the latter. The instantaneous nature of the device general corrosion measurement represents a “real-time condition” on a Mils-Per-Year (MPY) scale (1 Mil = 1/1,000 inch) based on the specific metallurgy being assessed and will in many cases vary, in a short time scale, from a corrosion coupon. The LPR data should be used to best understand the linear relationship with coupons and for real-time application performance assessment and adjustment.

CR-301

The Pyxis CR-301 corrosion rate sensor is ideal for extreme environmental and sample conditions in process application monitoring where robustness and affordability are a must. The sensor utilizes the linear polarization resistance (LPR) method to produce a raw signal. The raw signal is conditioned, amplified, and digitized directly in the sensor itself. This avoids the interferences and attenuation of the raw signal caused by long-distance wiring needed for other corrosion probes to a separate signal conditioner or transmitter box. The Pyxis CR-301 corrosion sensor measure sample water conductivity directly and compensate for the conductivity impact on the LPR measurement. These unique product characteristics make the Pyxis LPR superior in performance and accuracy. In addition to the LPR measurement to obtain the general corrosion rate, the CR-301 sensor also measures electrochemical noise. The measured noise data is used to calculate an index to quantify the localized corrosion rate also referred to as pitting.

CR-301 Typical Applications

- High Temperature / High Pressure Applications
- Geothermal - Process
- District Energy - Heating
- Oil & Gas – Process / Produced Water

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Features

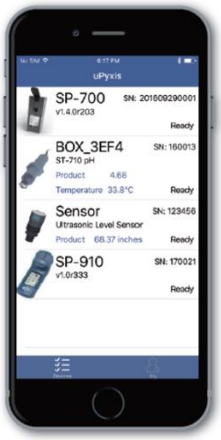
The **CR-301** is a standalone high temperature and high pressure rated LPR corrosion sensor that can be powered by a 24 VDC power source such as an existing controller, PLC or DCS. The sensor is composed of Titanium and PEEK (Polyether Ether Ketone) making it highly resilient to extreme process environments, temperatures and pressures. The CR-301 also offers an expanded general corrosion range as high as 995 mils per year and localized corrosion index as high as 100.

When used with the provided MA-CR Pyxis Bluetooth Adapter, the CR-301 must be configured via the **uPyxis** APP for Mobile or Desktop devices. The uPyxis app is used to configure the CR-301 for the metallurgy desired, assign a sensor identification name, obtain live sensor readings. Default measurement ranges and alloy factors will be applied to the CR-301 via the uPyxis APP when the user selects the metallurgy desired. Custom alloy factors and ranges of measurement may be adjusted if desired. Additional diagnostic information is available and can be used for determining the sensor performance or the need for maintenance.

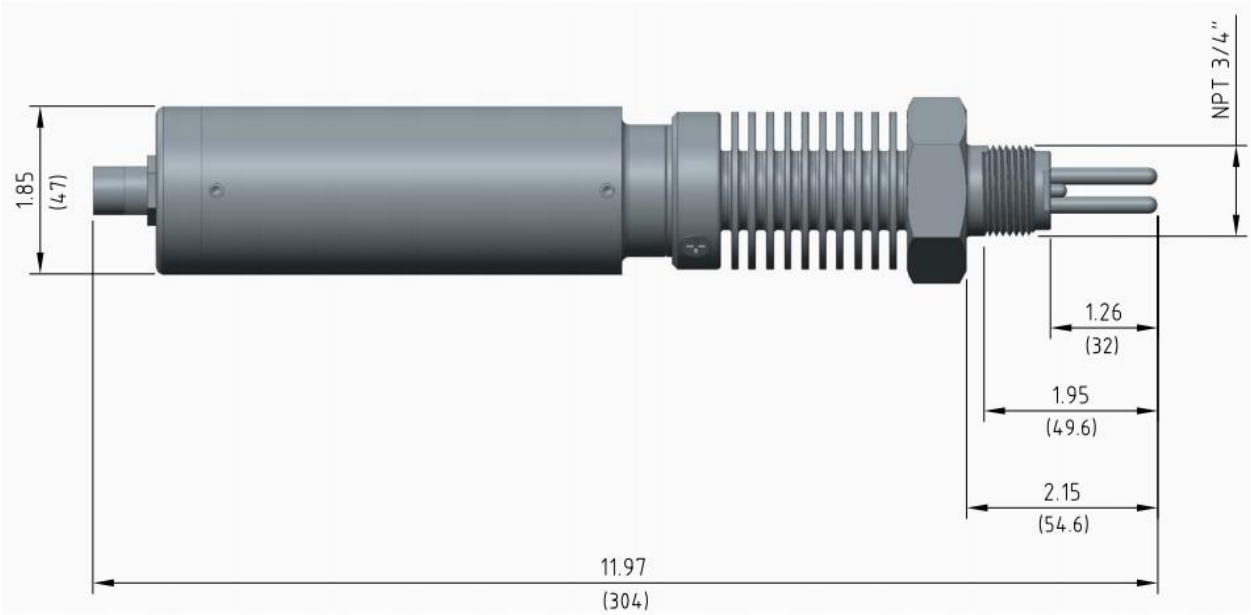
- Anti-electromagnetic interference (anti-EMI) design with Titanium sensor body
- 2x 4-20mA Outputs (General Corrosion and Localized Corrosion)
- RS-485 Modbus Output
- Integrated Cooling Fin Design for High Temperature Applications
- Bluetooth connectivity to uPyxis app when used with MA-CR Adapter
- Default 4-20-mA Output scales and Alloy Factors assigned for selected metallurgy via uPyxis
- Customization of Alloy Factor and upper MPY / Index (20mA) scale as desired via uPyxis
- Ultra-low general corrosion rate detection down to 0.001 MPY

uPyxis APP Configuration

The uPyxis APP manages all Pyxis portable meter and inline sensors on mobile and desktop devices, including Apple iPhones and Samsung Android smartphones. When connected to the Pyxis CR series corrosion rate sensors, the uPyxis APP enables users to configure the sensor for the specific metallurgy desired as well as name the sensor, system and data log frequency in addition to offering live corrosion rate data trending. For wireless access to CR-301, the MA-CR Bluetooth Adapter will be required. One MA-CR adapter is provided with the purchase of each CR-301. ***Note*** The uPyxis Mobile APP is evolving rapidly and users can find the latest version at no cost on Apple iStore or Google Play.



CR-301 Dimensions (in/mm)



Installation Format Recommended

Specifications

Item	CR-301
P/N	51021
General Corrosion Range - MPY *(4-20mA Output)*	0.001-995 *(Default Assigned MPY is Customizable Via uPyxis)*
Resolution	0.001 MPY or 1% of Reading
Localized Corrosion Range – Index *(4-20mA Output)*	0.001-100 *(Default Assigned Index is Customizable Via uPyxis)*
Conductivity Compensation	10-50,000uS/cm
Reading Interval	3 to 1440 Minutes *(>3 Minutes Required for Localized Corrosion Data)*
Alloy Factor Range	0 – 3 *(Adjustable Default Assigned via uPyxis on Metallurgy UNS Code)*
Power Supply	24V DC,2W
Output	RS-485 and 4-20 mA Dual Output
Weight	1150g
Dimensions (L x D)	280mm L X 52mm D
Installation	3/4” NPT
Enclosure Material	Titanium + PEEK
Operating Pressure	Up to 500 psi (34.5 bar)
Operating Temperature	-10 – 240°C (14 – 464°F)
Storage Temperature	-20 – 70°C (-4 – 158°F)
Cable Format	8Pin - 5 ft. (1.5 m), *(Extension Cables Available)*
Protection	IP68
Regulation	CE / RoHS

CR-301 - Wired / 24VDC LPR Corrosion Sensor Package (P/N 51021)

- The package should include one CR-301 sensor, a 5-foot extension cable terminated with connectors, a 2-foot flying lead cable with one end terminated with a connector
- One Bluetooth Adapter for CR-301 (P/N: MA-CR)
- One Bluetooth Adapter for PC (P/N: MA-NEB)
- One pair of copper (P/N: 51003) and one pair of mild steel electrodes (P/N: 51002)
- One 2.0 MPY Calibration Check/verification cap (P/N: 51010)
- One 0.1 MPY Calibration Check/verification cap (P/N: 51011)

CR-Series Accessories

PYXIS CORROSION SENSOR ACCESSORIES

Accessory Name / Description	Part #	Photo
MA-10CR - 10' Cable for CR300 LPR Sensor	50741	
MA-20CR - 20' Cable for CR300 LPR Sensor	50742	
MA-50CR - 50' Cable for CR300 LPR Sensor	50743	
MA-100CR - 100' Cable for CR300 LPR Sensor	50744	
MA-4.9CR - 4.9 ' Cable For CR300 LPR Sensor	50745	
MA-1.5CR - 1.5 Meter Connection Cable For CR300 w Flying Leads	50746	
CR-200 3.6V ER26500 Battery	50730	
2.0 MPY Calibration Cap	51010	
0.1 MPY Calibration Cap	51011	
CR-Series Bluetooth Adapter - 8Pin	MA-CR	
CE-01 Mild Steel Electrode Pair	51002	
CE-02 Copper Electrode Pair	51003	

Test Metal Electrodes Offered via uPyxis APP

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Common Designation	UNS	Alloy Factor	Default 4-20mA General Corrosion Scale (MPY)	Default 4-20mA Localized Corrosion Scale (Index)
Aluminum AA1100	A91100	0.94	0-50	0-100
Aluminum AA6061	A96061	0.94	0-50	0-100
Aluminum AA2024	A92024	0.86	0-50	0-100
Cu/Ni - 70/30	C71500	1.50	0-5	0-10
Copper 110 ETP	C11000	2.00	0-5	0-10
CDA 687 Aluminum Brass Arsenical	C68700	1.62	0-5	0-10
CDA 642 Aluminum Silicon Bronze	C64200	1.48	0-5	0-10
Arsenical Admiralty Brass CDA443	C44300	1.67	0-5	0-10
Phosphorized Admiralty Brass CDA445	C44500	1.68	0-5	0-10
Pipe Grade Carbon Steel	A135	1.00	0-50	0-100
Mild Steel C1010	G10100	1.00	0-50	0-100
Mild Steel C1015	G10150	1.00	0-50	0-100
Mild Steel C1018-C1020	G10180	1.00	0-50	0-100
Mild Steel C1080	G10800	1.00	0-50	0-100
Stainless Steel 304	S30400	0.89	0-2.5	0-10
Stainless Steel 304L	S30403	0.89	0-2.5	0-10
Stainless Steel 316	S31600	0.90	0-2.5	0-10
Stainless Steel 316L	S31603	0.90	0-2.5	0-10
Duplex Stainless 2205 - F51	S31803	0.90	0-2.5	0-10
Duplex Stainless 2507 - F53	S32750	0.90	0-2.5	0-10
Common Lead	L50045	2.57	0-2.5	0-1

***NOTE* LPR Electrode Notes** - *Metal electrodes with a different length and a slightly different diameter may be used with the CR-200/300 sensor if the electrodes have a 4-40 internal thread and has a surface are of 5 cm^2. The alloy factor for a given metal alloy is proportional to the surface area of the electrode. If an electrode with a surface area different than 5 cm^2 (0.736 square inch) is used, the user will need to calculate the proper alloy factor according to the surface area and the default 5cm^2 alloy factor listed above.*