

CR-Series LPR Corrosion Rate Sensors



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.

The Pyxis CR-Series corrosion rate sensors are ideal for cooling and process water treatment monitoring where robustness and affordability are a must. The sensors utilize 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 corrosion sensors measure sample water conductivity directly and compensate for the conductivity impact on the LPR measurement up to 10,000 $\mu\text{S}/\text{cm}$. 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-Series sensors also measure electrochemical noise. The measured noise data is used to calculate an index to quantify the localized corrosion rate also referred to as pitting.

Typical Applications

- *Cooling & Process Water Monitoring*
- *Mill Supply, Once-Through & Closed Loop Systems*
- *Domestic Water Monitoring*

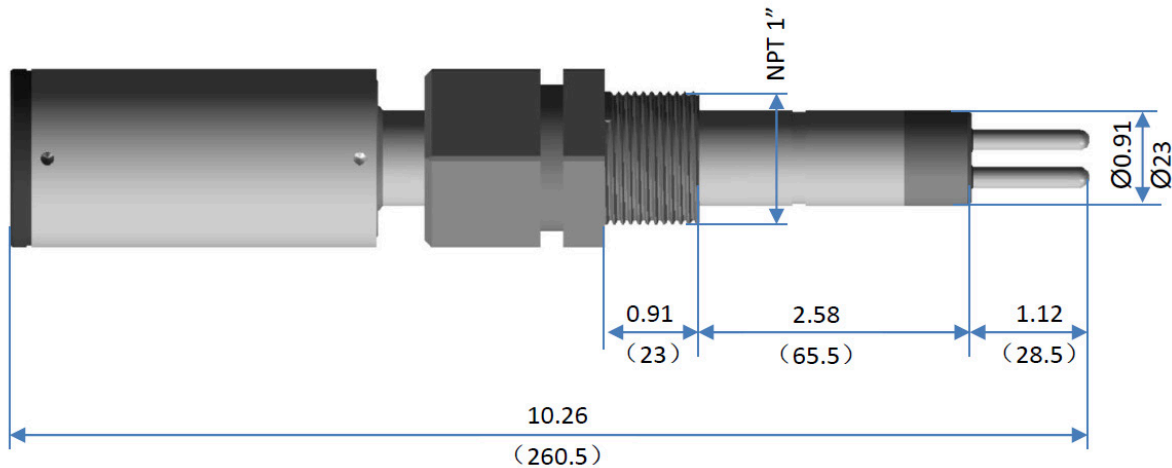
To Learn More, Contact Us at order@pyxis-lab.com

Features

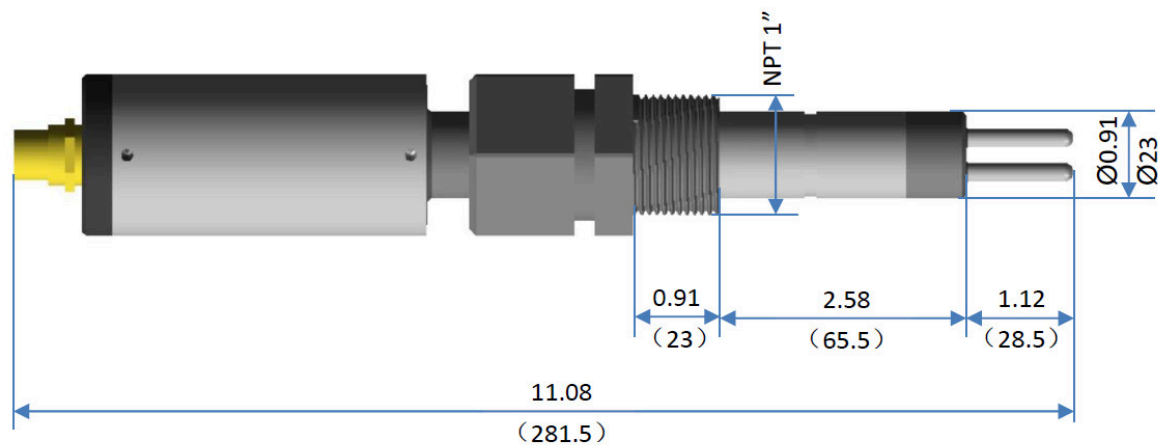
The CR-200 is a battery powered, portable and Bluetooth enabled LPR corrosion sensor for true wireless connectivity. The CR-200 makes it possible to monitor corrosion at multiple test points, avoiding the complications of running power and signal output wires from the sensor to a controller and/or display unit or data logging unit. The CR-200 sensor can store up to 6-months of data within its PCB that can be wirelessly transferred as a CSV file using the uPyxis APP for Mobile or Desktop devices.

The CR-300 is a standalone sensor that can be powered by a 24 VDC power source such as an existing controller, PLC or DCS network. The output data signals for both general and localized corrosion are offered in both 4-20mA and RS-485 modbus using the provided 8Pin cables with quick adapters. The CR-300 will come with one MA-CR Pyxis Bluetooth Adapter allowing the unit to be wirelessly configured and viewed via the uPyxis APP for Mobile or Desktop devices.

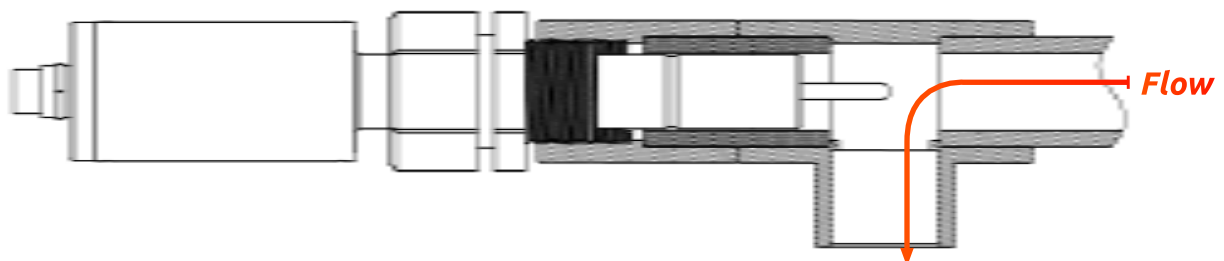
CR-200 Dimensions (in/mm)



CR-300 Dimensions (in/mm)



Recommended Installation Format



Specifications

Item	CR-200	CR-300
P/N	51006	51007
Power Supply	3.6V ER26500 Battery	24V DC, 2W
Output	Bluetooth® 4.1 (32ft, 10m Line of Sight)	4-20mA & RS-485 Dual Outputs
Data Storage	6 Months (at 30min per sample)	N/A
Dimensions	10.3in L x 0.9in Lower D, 1.7in Upper D	11.1in L x 0.9in Lower D, 1.7in Upper D
Weight	655g with Battery	687g
Cable Length	N/A	5ft, 1.5m (Extension Cables Available)
Gen. Corrosion Range	0.001–10.000 (MPY Default based on Metallurgy selected on uPyxis, 4-20mA Output)	
MAX General Range	0.001–995 (MPY Customizable via uPyxis, 4-20mA Output)	
Loc. Corrosion Range	0.001–100 (Index Customizable via uPyxis, 4-20mA Output)	
MAX Localized Range	0.001–100 (Index Customizable via uPyxis, 4-20mA Output)	
Conductivity Comp.	10–10,000µS/cm	
Sample Temperature	-20–50 °C	
Reading Interval	3–1440 minutes (>3min Required for Localized Corrosion Data)	
Resolution	0.001MPY	
Alloy Factor	0–3 (Adjustable Default assigned via uPyxis Metallurgy UNS Code)	
Installation	Flow Cell with 1" NPT	
Enclosure Material	304 Stainless Steel	
Working Pressure	Up to 100psi (7 bar)	
Temperature	Working: -10–50 °C, Storage: -20–70 °C	
Protection	IP65	
Regulation	CE/RoHS	

Pyxis®

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Test Metal Electrodes Offered on uPyxis®

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. The uPyxis APP also allows users to add customized metallurgies, general corrosion rate range, localized corrosion index and alloy factors.

Note The uPyxis Mobile APP is evolving rapidly and users can find the latest version at no cost on Apple iStore or Google Play. The uPyxis Desktop APP may be downloaded at <https://pyxis-lab.com/support-2/>

Common Designation	UNS	Alloy Factor	Default 4-20mA Generalized Corrosion Scale (MPY)	Default 4-20mA Localized Corrosion Scale (Index)
Aluminium AA1100	A91100	0.94	0-50	0-100
Aluminium AA6061	A96061	0.94	0-50	0-100
Aluminium AA2024	A92024	0.86	0-50	0-100
Cu/Ni - 70/30	C71500	1.50	0-5	0-10
Copper 110ETP	C11000	2.00	0-5	0-10
CDA 687 Aluminium Brass Arsenical	C68700	1.62	0-5	0-10
CDA 462 Aluminium Silicone 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	0-10
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 area of 5 cm². 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 cm² (0.736 square inch) is used, the user will need to calculate the proper alloy factor according to the surface area and the default 5cm² alloy factor listed above.

CR-200 LPR Corrosion Sensor Package Details (P/N: 51006)

- (1) CR-200 Sensor
- (1) 3.6V ER26500 Battery
- (1) Pair of Copper (P/N: 51003) + (1) Pair of Mild Steel Electrodes (P/N: 51002)
- (1) 2.0 MPY Calibration Check/Verification Cap (P/N: 51010)
- (1) 0.1 MPY Calibration Check/Verification Cap (P/N: 51011)
- (1) USB Bluetooth Adapter for PC (P/N: MA-NEB)
- Operation Manual is also available for download at <http://www.pyxis-lab.com/document-library/>

CR-300 LPR Corrosion Sensor Package Details (P/N: 51007)

- (1) CR-300 sensor, a
- (1) 5ft Extension Cable Terminated with Connectors,
- (1) 2ft Flying Lead Cable with one end Terminated with a Connector
- (1) Bluetooth Adapter for CR-300 (P/N: MA-CR)
- (1) Bluetooth Adapter for PC (P/N: MA-NEB)
- (1) Pair of Copper (P/N: 51003) + (1) Pair of Mild Steel Electrodes (P/N: 51002)
- (1) 2.0 MPY Calibration Check/Verification Cap (P/N: 51010)
- (1) 0.1 MPY Calibration Check/Verification Cap (P/N: 51011)
- Operation Manual is also available for download at <http://www.pyxis-lab.com/document-library/>



uPyxis® Configuration

The uPyxis App is available for mobile and desktop devices and is used to configure and obtain live sensor readings, assign the system name, sensor name, metallurgy desired and allows customized corrosion ranges and alloy factors if desired. The uPyxis APP when connected to the CR-Series sensors offers over 20 of the most commonly measured metallurgies with pre-loaded default general corrosion rate scale, localized corrosion index scale and alloy factors based on common application ranges and UNS code. These factors may be edited as desired by the user within the uPyxis APP to allow for an expanded or reduced scale of measurement as high as 995 mils per year and alloy factors ranging from 0 to 3, offering a truly customizable sensor. When the settings are applied in uPyxis, the sensor will be wirelessly configured to the values selected by the user. For CR-300, the output signals via 8Pin wire will reflect the new ranges assigned to the device and should be applied to the receiving controller to ensure a direct match and value displayed. Additional diagnostic information is available and can be used for determining the sensor performance and conformance to calibration.

- *Anti-electromagnetic interference (anti-EMI) design with stainless steel sensor body*
- *Wired 4-20mA and RS-485 Data Output (CR-300) with Bluetooth access using MA-CR Adapter*
- *Wireless Data Output Transfer via uPyxis APP (CR-200) with integrated Bluetooth Chip*
- *CR-200 Battery life up to 1 year thru using our ultra-low power design and smart power management*
- *Three O-ring grooves positioned on the sensor body allow insertion depth control*
- *Both units configured via Bluetooth and uPyxis APP for Mobile or Desktop devices*
- *Ultra-low corrosion rate detection as low as 0.001 mils per year (MPY)*
- *Default Corrosion Rate Ranges and Alloy Factor Assigned with Metallurgy selection via uPyxis APP*
- *Customization of Corrosion Rate Ranges and Alloy Factor Available via uPyxis APP*
- *Maximum of 995 mils per year measurement capability at maximum alloy factor*
- *Accurately Measure Generalized Corrosion & Localized Corrosion Rate*
- *2.0 MPY and 0.1 MPY Corrosion Calibration Check Caps provided for sensor performance verification*

