

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.

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

CR-301 Typical Applications

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

Features

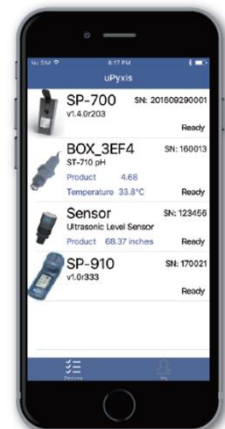
The **CR-301** is a standalone high temperature and high pressure rated LPR corrosion sensor that can be powered by a 24 VDC power source such as an existing controller, PLC or DCS. The sensor is composed of Titanium and PEEK (Polyether Ether Ketone) making it highly resilient to extreme process environments, 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.

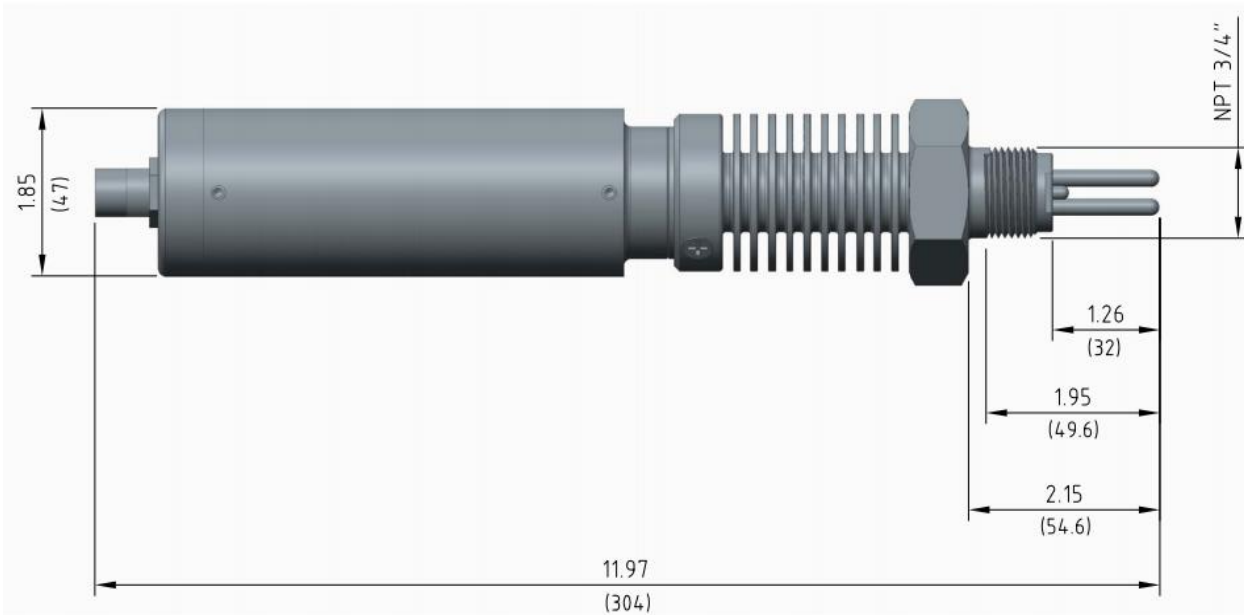
- Anti-electromagnetic interference (anti-EMI) design with Titanium sensor body
- 2x 4-20mA Outputs (General Corrosion and Localized Corrosion)
- RS-485 Modbus Output
- Integrated Cooling Fin Design for High Temperature Applications
- Bluetooth connectivity to uPyxis app when used with MA-CR Adapter
- 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. The uPyxis Desktop APP may be downloaded at <https://pyxis-lab.com/support-2/>



CR-301 Dimensions (in/mm)



Installation Format Recommended



Specifications

| Item | CR-301 |
|---|---|
| P/N | 51021 |
| General Corrosion Range - MPY <i>(4-20mA Output)</i> | 0.001-995 <i>(Default Assigned MPY is Customizable Via uPyxis)</i> |
| Resolution | 0.001 MPY or 1% of Reading |
| Localized Corrosion Range – Index <i>(4-20mA Output)</i> | 0.001-100 <i>(Default Assigned Index is Customizable Via uPyxis)</i> |
| Conductivity Compensation | 10-50,000uS/cm |
| Reading Interval | 3 to 1440 Minutes <i>(>3 Minutes Required for Localized Corrosion Data)</i> |
| Alloy Factor Range | 0 – 3 <i>(Adjustable Default Assigned via uPyxis on Metallurgy UNS Code)</i> |
| 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), <i>(Extension Cables Available)</i> |
| 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)
- Operation Manual is also available for download at <http://www.pyxis-lab.com/support.html>



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 | |
| <p>*NOTE* Pyxis Lab does not manufacture LPR electrodes. Some electrodes are provided by Pyxis Lab from Metal Samples as a convenience. UNS Codes for each electrode format are provided in the Test Metal Electrodes section. Users may purchase these electrodes directly from Metal Samples at https://www.alspi.com/ms.htm.</p> | | |

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 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.