

Solar Powered Cathodic Protection Using Direct-DC Power

Solar Powered Cathodic Protection: Benefits of Using CPX Controller Compared to Conventional Methods

Shallow water pipeline platforms dot the marshy coast off Louisiana. In this environment, salt water corrosion is an ongoing problem for pipeline operators. To maintain the integrity of the pipeline and platform structure, operators rely on Cathodic Protection in the form of an Impressed Current Cathodic Protection (ICCP) system. However, an ICCP system requires its own dedicated power source.

On just such a platform located in shallow offshore water, a pipeline operator investigated several options for a dedicated power source for an ICCP system: electric utility power, diesel generator power, wind or solar power. Installing electric utility cables in saltwater for that distance proved to be prohibitively expensive, and was compounded by an impractical timeline. Power from a diesel generator requires frequent maintenance, and wind is unpredictable. With a year-round requirement of around 20A at 24VDC, a solar power system seemed the best choice.

Problem: The solar power solution appeared straightforward. But, after calculating the power requirement, the existing wooden platform needed to be enlarged to accommodate an 11kW solar array.¹ Construction of the platform extension was an unplanned expense and would delay the project by months.

To explain why the solar array was so large, consider that conventional solar cathodic protection proposes to power a standard AC to DC rectifier through an inverter, which is powered with a battery bank charged by a solar array. The conversion from DC to AC and back to DC again, compounds the 'drag' the already inefficient devices have on the system. This ratio between solar array size and load size underlines the importance of using highly efficient methods and hardware in these applications.

Solution: Solarcraft offered an alternative solution utilizing a 95% efficient CPX CP Controller. The 480W load adjusted for efficiency using Solarcraft's CPX Controller looked like this: $480W / 0.95 = 505W$ as compared to the conventional approach.¹ Instead of the 11kW solar array that was initially quoted, the Solarcraft solution required only a 7kW array, almost 40% smaller! Not only was the Solarcraft array smaller, easier to transport and install, but it fit on the existing platform, eliminating the need for platform expansion. In addition, CPX's remote monitoring and control capabilities provide remote status reading, high-speed interrupt, and output voltage adjustments.

To summarize, the Solarcraft system using the CPX Controller saved the client 40% of the cost over the initial proposal, plus eliminated the unplanned expense of the platform expansion. In addition, with the added performance capabilities of the CPX controller, the new system is a cost-effective, reliable, and intelligent solution. To learn more about the highly efficient and reliable CPX Cathodic Controller, and solar-powered Cathodic Protection systems, please contact Solarcraft.

¹ Load calculation based on conventional CP methods: $20A \times 24V = 480W$ load on the 70% efficient rectifier, implies that the rectifier is drawing $480W / 0.7 = 685W$ from the inverter. In turn, the 85% efficient inverter draws $685W / 0.85 = 805W$ from the battery bank. This load, located in Louisiana, required an 11kW solar array to hold up the load through a typical overcast winter.

BACKGROUND:

What is Impressed Current Cathodic Protection (ICCP)?

Impressed current anode systems utilize an external DC power supply to drive electrical current flow. The use of an external power supply enables an impressed current system to generate sufficient current output.

What are the advantages of Solar ICCP?

ICCP is ideal for reducing corrosion on buried structures such as pipelines and storage tanks and is scalable to suit any size structure. In addition, the external DC power supply allows for control of the electrical current flow, increasing and decreasing current to efficiently maximize protection of the structure.

Solar power, because it generates Direct Current (DC), is a practical power source for external DC current, especially on remote sites. Solar power combined with ICCP controllers is an economic and highly reliable solution.



▲ Coastal pipeline platform using CPX Cathodic Controller and solar power.



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