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# SUNRANCH SOLAR NEWSLETTER

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# THE CONTROL BEHIND THE STEAM

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## PRECISION CONTROL ENGINEERING FOR MARSHALL FOWLER'S ELECTRODE BOILER SYSTEM

In support of Marshall Fowler's engineering requirements, SunRanch Solar was commissioned to update the complete control circuit design for a 2 MVA electrode boiler installation. The project focused on producing detailed electrical wiring diagrams necessary to ensure safe and reliable operation of the system.

Electrode boilers are widely used in industrial applications where rapid, controlled steam generation is required. By passing electrical current directly through water, the system produces heat efficiently and converts the water to steam for various applications.

With a power rating of 2 MVA, the boiler operates at a scale where electrical control and protection systems must be clearly defined and meticulously documented.



## ELECTRICAL ARCHITECTURE AND SYSTEM DESIGN

Each electrode boiler within the installation is supplied through its own dedicated 2 MVA transformer, ensuring sufficient capacity and electrical isolation for the load.

Our scope of work involved the preparation of full control wiring diagrams. These diagrams define the detailed control circuitry required to operate the boiler safely, including the integration of multiple electrical protection systems specified by Marshall Fowler.



Key protection and control elements incorporated into the design include:

- 2000 A circuit breaker protection
- **Phase Failure Protection** – Detecting phase loss or imbalance in the supply system, preventing the boiler from operating under unsafe electrical conditions.
- **Step and Touch Potential Protection** – Ensuring safe voltage conditions around the installation to protect personnel from hazardous potential differences.
- **Neutral Earth Resistance (NER/NEC) Protection** – Controlling earth fault currents to minimise damage and improve system stability during fault conditions.

These protection mechanisms form a comprehensive electrical safety framework, ensuring that the boiler system responds appropriately to abnormal conditions and maintains operational integrity. These electrical protection systems are further complemented by Marshall Fowler's integrated mechanical safety features

which provide an additional layer of protection should the electrical control circuit fail to respond.

## PRECISION DOCUMENTATION FOR COMPLEX SYSTEMS

While the system itself is well established technology, the reliability of high-power installation depends heavily on accurate and detailed electrical control documentation.

The wiring diagrams produced for this project serve as the technical foundation for installation and long-term maintenance, providing engineers and technicians with clear understanding of the control logic and electrical protection structure within the system.

In environments where megawatt-scale electrical equipment is involved, clarity in design documentation is not simply beneficial – it is essential.

## SUPPORTING INDUSTRIAL ENGINEERING PROJECTS

This project reflects the type of engineering support often required in large industrial systems: precise, specification-driven work that ensures equipment performs safely and predictably in demanding environments.

By delivering the complete control circuit design aligned with Marshall Fowler's requirements, our team provided the documentation necessary to support the successful implementation of the electrode boiler installation.

It is attention to detail in electrical design and control engineering that underpins reliable industrial energy systems.



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