

Single-Line Diagrams

Ensuring Compliance

An effective single-line diagram will clearly show how the main components of the electrical system are connected, including redundant equipment and available spares. It shows a correct power distribution path from the incoming power source to each downstream load – including the ratings and sizes of each piece of electrical equipment, their circuit conductors, and their protective devices.

In many facilities, loads are continually added or removed in small increments. The net effect is not always seen until some part of the system becomes overloaded or exhibits other problems. Many times circuits are added without appropriate modifications of the standard settings on the associated upstream circuit breakers. Regardless of which protective devices you use, they must be coordinated with regard to their time/current curves and with each other. The single-line diagram provides the road map to enable proper design of equipment, redundancy, and protection.

Benefits

- Highlights potential risks before a problem occurs
- Ensures critical response plans work effectively
- Keeps facility compliant with code regulations
- Ensures optimum system performance, efficiency, and safety



The single-line diagram provides the road map to enable proper maintenance of equipment, design redundancy, and protection of your electrical distribution system

Power distribution systems are complex electrical networks of energy composed of many intricate elements which can malfunction in an instant. In many facilities, loads are continually added or removed in small increments. The net effect is not always seen until some part of the system becomes overloaded or exhibits other problems. The single-line diagram is the first step to understanding and correcting the problem. Emerson's Electrical Reliability Services team can conduct a site survey to create or renew your facility's single-line diagram, ensuring that your facility is compliant and accurately documented.

Single-line Diagram Development

The single-line diagram is the blueprint for electrical system analysis. It is the first step in preparing a critical response plan, allowing you to become thoroughly familiar with the electrical distribution system layout and design in your facility. A typical diagram will include:

- Incoming lines showing voltage and size
- Incoming main fuses, potheads, cutouts, switches, and main / tie breakers
- Power transformers (rating, winding connection and grounding means)
- Feeder breakers and fused switches
- Relays (function, use and type)
- Current and / or potential transformers with size, type and ratio
- Control transformers
- All main cable and wire runs with their associated isolating switches and potheads (size and length of run)
- All substations, including integral relays and main panels with total load of each feeder and each substation
- Critical equipment voltage and size (UPS, battery, generator, power distribution, transfer switch, computer room air conditioning)

Whether your plant is new or existing, the single-line diagram becomes your life line of information when updating or responding to an emergency. An accurate diagram ensures optimum system performance and coordination for all future testing and can highlight potential risks before a problem occurs.

Site Survey

The first step to creating or updating a single-line diagram is performing an on-site survey of your electrical system. Collecting this information will determine what elements need to be deleted or added in the overall schematic helping us create a building block of



Ordering Information

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knowledge. Once the assessment is complete, our team will create a new professional single-line diagram for your records. Services include:

- Take an inventory of all equipment
- Confirm all loads connected to emergency/standby feeders
- Verify potential single-points of failure
- Evaluate overall system design and determine whether the system can be maintained without shutdown
- Evaluate or create a process to maintain up-to-date drawings
- Provide a report of findings with recommendations
- Update customer provided single-line diagrams and provide an AutoCAD formatted version of the new single-line diagram
- Post updated diagram at facility

Compliance and Safety

Many electrical systems transform over time causing concern for safety issues. According to NFPA-70E, it is a requirement to have an accurate, single-line diagram for each facility site. Emerson can keep you compliant and ensure the safety of your workplace by updating your facility's single-line diagram. Our staff of highly trained and experienced professionals stay informed of the latest code regulations of the electrical industry. We strive to take measures that ensure your compliance and safety at your facility.

Future Maintenance

The single-line diagram serves as the road map for system analysis, future testing services and maintenance. Current documentation is vital in order to perform other engineering studies including:

- Short Circuit Studies
- Coordination Studies
- Load Flow / Power Factor Studies
- Power System Studies
- Arc Flash Studies
- Reliability Studies

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