electromechanical stresses can destroy mechanical components such as gears, couplings, and shafts and can displace coils.

See Part II of Article 705 for microgrid system requirements, including the necessary interconnect device if a microgrid system is operating in stand-alone mode (islanded).

**705.45 Unbalanced Interconnections.**

**(A) Single Phase.** Single-phase power sources in interactive systems shall be connected to 3-phase power systems in order to limit unbalanced voltages at the point of interconnection to not more than 3 percent.

Informational Note: For interactive power sources, unbalanced voltages can be minimized by the same methods that are used for single-phase loads on a 3-phase power system. See ANSI/C84.1-2016, *Electric Power Systems and Equipment — Voltage Ratings (60 Hertz)*.

**(B) Three Phase.** Three-phase power sources in interactive systems shall have all phases automatically de-energized upon loss of, or unbalanced, voltage in one or more phases unless the interconnected system is designed so that significant unbalanced voltages will not result.

## Part II. Microgrid Systems

The requirements in Article 705 apply to power production systems that operate in parallel with a primary supply. Section 705.40 requires that the ungrounded conductors of the power production source be automatically disconnected from the ungrounded conductors of the primary source. Section 705.40 permits inverters to provide the disconnection of the load from the primary source and the power production source to operate as a stand-alone system.

**705.50 System Operation.** Interconnected microgrid systems shall be capable of operating in interactive mode with a primary source of power, or electric utility, or other electric power production and distribution network. Microgrid systems shall be permitted to disconnect from other sources and operate in island mode.

Informational Note No. 1: Microgrid systems often include a single source or a compatible interconnection of multiple sources such as engine generators, solar PV, wind, or ESS.

Informational Note No. 2: See Article 517 for health care facilities incorporating microgrids.

**705.60 Primary Power Source Connection.** Connections to primary power sources that are external to the microgrid system shall comply with the requirements of 705.11, 705.12, or 705.13. Power source conductors connecting to a microgrid system, including conductors supplying distribution equipment, shall be considered as power source output conductors.

**705.65 Reconnection to Primary Power Source.** Microgrid systems that reconnect to primary power sources shall be provided with the necessary equipment to establish a synchronous transition.

Δ **705.70 Microgrid Interconnect Devices (MID).** Microgrid interconnect devices shall comply with the following:

(1) Be required for any connection between a microgrid system and a primary power source
(2) Be evaluated for the application and have a field label applied or be listed for the application
(3) Have overcurrent devices located to provide overcurrent protection from all sources

Informational Note: MID functionality is often incorporated in an interactive or multimode inverter, energy storage system, or similar device identified for interactive operation.

*N* **705.76 Microgrid Control System (MCS).** Microgrid control systems shall comply with the following:

(1) Coordinate interaction between multiple power sources of similar or different types, manufacturers, and technologies (including energy storage)
(2) Be evaluated for the application and have a field label applied, or be listed, or be designed under engineering supervision
(3) Monitor and control microgrid power production and power quality
(4) Monitor and control transitions with a primary source external to the microgrid

Informational Note: MID functionality is often incorporated in an interactive or multimode inverter, energy storage system, or similar device identified for interactive operation.

## *N* Part III. Interconnected Systems Operating in Island Mode

*N* **705.80 Power Source Capacity.** For interconnected power production sources that operate in island mode, capacity shall be calculated using the sum of all power source output maximum currents for the connected power production source.

*N* **705.81 Voltage and Frequency Control.** Power sources operating in island mode shall be controlled so that voltage and frequency are supplied within limits compatible with the connected loads.

*N* **705.82 Single 120-Volt Supply.** Systems operating in island mode shall be permitted to supply 120 volts to single-phase, 3-wire, 120/240-volt distribution equipment where there are no 240-volt outlets and where there are no multiwire branch circuits. In all installations, the sum of the ratings of the power sources shall be less than the rating of the neutral bus in the distribution equipment. This equipment shall be marked with the following words or equivalent:

WARNING: SINGLE 120-VOLT SUPPLY
DO NOT CONNECT MULTIWIRE
BRANCH CIRCUITS

The warning sign(s) or label(s) shall comply with 110.21(B).