Power Supply

SCR Solid State Technology

Power Range: 750kW – 6,000kW

Input Voltage: 380V, 415V, 480V, 600V, 675V (+0-10%), 3ø, 50/60 Hz

Frequency Range: 200Hz, 600Hz, 1000Hz, and 3000Hz

The MK-17, current fed, Parallel SCR inverter has the highest conversion (AC-DC-AC) efficiency. The parallel tuned tank circuit allows for relatively low currents through the SCR's without the need of series reactors. Low current levels and low component count ensure maximum efficiency of the conversion.

The SCR current is accurately controlled under both normal and fault conditions by using high speed electronic controls together with a large choke. This level of control is essential in the larger power levels to ensure equipment reliability.

The coupling capacitors give virtually no loss voltage step-up from the inverter to the furnace voltage level. They also make the power supply self starting without adding additional components. These capacitors allow the power supply to accurately match the furnace characteristics, throughout the cycle, to achieve optimum efficiency and ensure the rectifier operates at near unity power factor.

Voltage protection of the circuit is maintained by simultaneously firing all the inverter SCR's (crow-bar circuit), coupled with the use of a large DC choke and a full power rated free of wheel diode.

The combination of current control, voltage control and electronic sophistication allows the power supply to be turned on and off at any selected power level.

System Features Include:

Semi-conductors Reliability is assured through Pillar's conservative rating of our SCR's providing ample voltage and current protection. Large capacity SCR's allow us to minimize the quantity of components thus optimizing efficiency. Parallel connected semi-conductors eliminate the need for matched sets of semi-conductors.

Control Board Incorporating the latest technology to provide the ultimate in ruggedness and reliability. The multi-layer board incorporates a ground plane providing the highest possible immunity to interference.

- Complete flexibility designed into the circuit to provide for data acquisition and computer controlled operation.
- Optional microprocessor control.
- Mounted in an easily accessible environmentally protected gasketed cabinet within the inverter cabinet door.
- Integrated circuit sockets provided for ease of replacement.

Inverter and Furnace Water Circuits

- Complete flexibility designed into the circuit to provide for data acquisition and computer controlled operation.
- A maximum inlet water temperature into the power supply of 115°F (46°C) ensures that over-temperature problems will not occur even in the warmest climates. All circuits are thermally monitored and protected.

MK-17

Features & Specifications

- A pressure differential switch ensures system water flow and individual pressure switches are used to protect each of the furnaces.
- Innovative circuit design along with platinized, non-sacrificial targets in the pressurized closed loop cooling system allows Pillar to avoid the expense and trouble of deionized and demineralized water systems.

Copper Bus Bar Copper bus bars, water cooled where necessary, to provide maximum transmission efficiency and accessibility to all cabinet components.

- Water cooling of bus bars reduces bus bar expansion and contraction and eliminates maintenance problems with bolted joints.
- Water cooling of resistors and other power components eliminates the need for any air-to-water heat exchanger, cabinet venting and associated electronic problems due to heat build-up.

Free Wheel Diode Sized to allow the power supply to be turned off, repeatedly, even at full power without harming the system. The rectifier output is grounded while in the standby (off) mode.

Ground Fault Interrupter Earth protection is provided by grounding the center of the incoming supply transformer. This practice, in accordance with international electrical codes, ensures optimum operator safety by providing an earth reference throughout the power supply and furnace circuit.

Constant Voltage Transformer A constant voltage transformer ensures stable control, even with a ± 10% variation of the incoming supply voltage. Additional voltage fluctuation beyond ± 10% will not damage the inverter.

PILLAR INDUCTION

Power Supply

Power Supply Features Continued

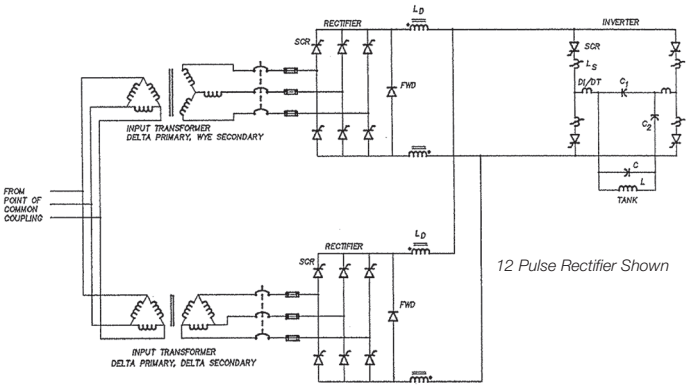
Pillar's Electronic Trip "Electrip" Electrip is the ultimate in dependability to shut down the system under any abnormal condition. Fuses are used only for back-up and redundant protection.

Multiple Capacitor Protection Inherent in the circuit design is a provision for shutdown with no damage to the system – eliminates any need for bulkhead compartments or pressure relief hatches.

- Pressure switches on each capacitor.
- For added protection, the inverter is designed to be incapable of operating with a faulty capacitor.
- Control circuit monitors system for proper operation and shuts down under abnormal conditions.

Standard Features

- **Current Fed, Parallel Tank SCR Inverter**
- **Efficient Coupling Method** Provides the best matching capabilities over a wider range of operating conditions.
- **12 Pulse System (optional) Reduces Line Distortion** by eliminating the 5th and 7th harmonics, and reduces the 11th and 13th harmonic, while increase conversion efficiency.
- **Full Range Power Adjustment** from a single operator control, with a range of 10% to 100%.



12 Pulse Rectifier Shown

- **Water Cooled Capacitors** with pressure sensitive safety switches.
- **Instrumentation**
  - Output power (KW) meter.
  - Ground Leakage Current Meter.
  - Alpha Numeric Operator Interface with large 4 x 20 character vacuum fluorescent display for operating information and diagnostics.
  - Operator controls including power on / off / reset, power level control, ground leakage detector test button.
- **Front or Bottom Power Lead Exit**

Standard Protective Devices

- **Lockable Doors** and circuit breaker (OSHA required)
- **Safety Interlock Door Switches** trip breaker if any door is opened.
- **Water Pressure Switches** on cabinet water inlet and each water valve to prevent power from being applied if the water is off.
- **Fault Memory Circuits** for positive indication of all trip sources.
- **Isolated Circuit Board Enclosure** with easy access to assist in meeting ARC Flash safety requirements.
- **Diagnostic Monitor Pinpoints the Location of Circuit Malfunctions.**

Optional Features

- **Remote Operator Panel** with the same alphanumeric display and controls as the power supply.
- **Demand Control Interface** as part of the microprocessor control system.
- **Temperature Control Interface** to enable connection of remote temperature controller for automatic power control.
- **Exportable control parameters for process monitoring.**

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