

Communications & Power Industries Heatwave Transmitter



This integrated industrial microwave power system uses a CPI VKS-7960A klystron, designed for industrial service, as the energy source. By using the high-efficiency, 2.45-GHz, 60 kW CW klystron in combination with modern control and power supply technology, CPI is able to furnish a compact, userfriendly, cost-effective industrial system.

The system's control center is an embedded microprocessor architecture which provides flexibility in selecting system operating parameters. Operation is initiated by two independent external enable commands. Control of the system is through a web-based browser via a direct Ethernet or web-based connection. Operational data is logged in the controller's onboard flash memory. The logged data may be uploaded to the external computer via the Ethernet connection for use in offline troubleshooting or other purposes.

The high-voltage power supply consists of a phase-angle adjustable SCR controller, a step-up transformer and a fullwave-bridge rectifier. There is no filter capacitor on the output of the rectifier, thus very little stored energy, which eliminates the need for a crowbar. As such, the DC output will have a ripple voltage of 10% peak to peak. This has the advantage of causing RF output amplitude and phase variation which facilitates modestirring and potentially a more even heating of the process. System interlocks will remove the high voltage in less than 10 ms in the event of a fault. In addition, the klystron beam (high voltage) power supply is remotely located. This makes it possible to offer the VIS102B in a corrosion resistant sealed stainless steel 2-bay enclosure. Cooling for the system is 100% via water; ambient air is not used for cooling purposes. A small flow of clean air is used to slightly pressurize the enclosure and keep potentially corrosive local ambient air from entering the inside of the enclosure.

FEATURES:

- 60 kW power RF output
- 2.45 GHz klystron
- Water cooled

BENEFITS:

- Highest power 2.45 GHz CW source available
- Easy to use and user friendly
- Built in diagnostics and built in test for local or remote troubleshooting.

APPLICATIONS:

- Industrial service

Instrumentation and control

All operating, control, and data-collection functions are performed by the embedded controller. Critical interlocks, such as those required for system or personnel safety are hard-wired.

The control-center is a digital logic system that monitors and controls the performance of the microwave power system. All system parameters, such as beam current, beam voltage and magnet current are displayed through a web-browser on the monitor of a remote computer via an Ethernet connection. The embedded controller takes the required actions to match the microwave output power to the user's setpoint command (input via the browser) for power. In addition, other user controls of the system are provided. Complete access to the status of each analog and digital input and output is also remotely available to the user.

The embedded controller uses flash-memory to log the status of each of its inputs and outputs in a rolling file system that makes the last several days of operating available to the user. This data is stored in a format that will load directly into many spreadsheet programs for ease of data manipulation. These files may be e-mailed to CPI for assistance in troubleshooting and trend analysis should that be desired.

Cabinetry

The system consists of 2 enclosures. The beam (high voltage) power supply may be remotely mounted from the main enclosure that houses the rest of the system. The main enclosure is a 2-bay stainless steel cabinet as shown on the first page. The larger left bay houses the embedded controller, distribution transformer, and several power supplies. The right bay houses the klystron, klystron driver, water cooling manifolds, other components, and output waveguide. Internal air circulating fans move air through air-water heat exchangers located in the partition between the 2 bays to be changed periodically based on the amount of debris in the area.

The voltage across the switch will change automatically as the voltage across klystron changes due to frequency and temperature changes. This switch is also will inherently limit arc current in the event of a klystron HV arc. The limit is less than twice the normal operating current in the event of a complete short circuit. The size of this switch assembly is 12 inches high by 10 inches deep by 6 inches wide and has integral fans to cool the switches.

All high voltage is contained in an oil tank which is 18 inches high by 23 inches wide and 20 deep. The pulse transformer that steps up the 2 kV high voltage power supply output to the 50 kV that the klystron requires, storage capacitor bank to supply the energy during the pulse, and the klystron filament DC filter are all contained in this oil tank. The Solenoid and the klystron are mounted on the top of the oil tank with the bushing of the klystron going through the top of the oil tank and is immersed in the oil. External fans are required to cool the klystron and the solenoid. The fans should be interlocked as the klystron and Solenoid can be damaged if sufficient cooling is not supplied.

Instrumentation and control

The system controller must provide 4 signals to the high voltage power supply to operate the klystron transmitter. They are a +15 V power-on signal that closes the main power contactor, +15 V that commands high voltage to be supplied to the IGBT switch, a +15 V gate that determines the duration that the IGBT switch is on (which determines the duration of the klystron beam pulse) and a contact closure-to-ground for a latched fault reset. These are all the signals necessary to operate the klystron transmitter.

CPI Heatwave Transmitter: VIS102B

SPECIFICATION	DESCRIPTION
CW Power Operation:	Adjustable to 60 kW maximum. Continuous control range in excess of 27 dB
Frequency:	2.45 GHz nominal. Tunable over plus or minus 5 MHz
Waveguide:	WR-430
Waveguide Arc Detector:	Standard. The Klystron window and the waveguide are protected by the control system, which will interrupt the RF drive power if arcs occur in the waveguide near the klystron.
Forward and Reflected Power Monitor:	A directional coupler at the klystron output is included. Excessive reflected power will also interrupt the RF drive power. A liquid cooled waveguide circulator capable of dissipating the full system power is available as an option.
Voltage:	480 volts 3 phase, 4-wire (wire per phase plus ground), 60 Hz
Line Current:	Approximately 165 Amp per phase at 60 kW microwave output power
Cooling:	Clean water from an external source capable of 50 GPM at 60 PSIG, 10 to 40 °C
Weight:	Approximately 2,500 pounds
Approximate Dimensions: (maximum in inches)	85" W x 80" H x 40"D
Other features:	The unit has casters for ease of positioning at installation. The unit also has lifting eyes on the top surface for pick-up via an overhead crane is easily moved by fork lift or single pallet jack.

Characteristics, dimensions and operating values are based upon design calculations and performance tests. The information in this technical data sheet may change without notice as the result of additional data or product refinement. Beverly division of CPI should be consulted before using this information for final equipment design.

With a history of producing high quality products, we can help you with your magnetron transmitter. **Contact us at BMDMarketing@cpii.com or call us at +1 978-922-6000.**



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For more detailed information, please refer to the corresponding CPI technical description if one has been published, or contact CPI. Specifications may change without notice as a result of additional data or product refinement. Please contact CPI before using this information for system design.
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