

# Trek Model 646

## Electrostatic Chuck Supply



Trek's Model 646 software-driven Electrostatic Chuck Supply offers an array of features that provide significant benefits while accommodating a variety of demanding applications. Model 646 incorporates Trek technology which has demonstrated increases in efficiency and throughput equal to three times that of other supplies. Virtual elimination of sticky wafer and wafer popping issues ensures better control over particle contamination.

Given the versatility and performance of the Model 646, it can be used in multiple unique tools/processes, thus eliminating the need to specify a new supply for each unique tool/process in a facility.

### Key Specifications

- Output Phasing:
  - Voltage A (Reference Phase) 0 to  $\pm 3$  kV
  - Voltage B (Phase B =  $[-1] \times$  Phase A) 0 to  $\pm 3$  kV
- Output Voltage Range: 0 to  $\pm 3$  kV
- Output Current Range: 0 to  $\pm 6.5$  mADC with a peak capability of 10 mA

### Typical Applications Include

- Electrostatic-driven handling of materials
- Semiconductor wafer processing
- Non-mechanical transfer of flat panels or other processing materials sensitive to mechanical handling

### Features and Benefits

- Supports both Coulombic and Johnsen-Rahbek ESC technologies
- User configurable for custom clamp and declamp sequences and wave shapes
- Electrostatic chuck profiles can be uploaded to the unit and stored internally via a user-friendly software interface
- Reduces backside gas errors, increases throughput, and eliminates sticky/popping wafer issues
- Lockable front panel control interface
- Ability to control parameters such as over-current, wafer-present and wafer-clamped thresholds, clamp voltage, offset voltage and internal or external amplitude/offset control
- Wafer detection includes no wafer, wafer present or wafer clamped status
- Includes in-process-adjustable amplitude/offset and output-control versatility
- Output can be controlled by back panel I/O, serial computer command or front panel controls
- NIST-traceable Certificate of Calibration provided with each unit



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## Model 646 Specifications

### Outputs

**Simultaneous High-Voltage Outputs** Two simultaneous high-voltage outputs (Output Phase A and Output Phase B) of equal magnitude and opposite in polarity relative to an offset voltage

#### Output Phasing

*Output Voltage A (Reference Phase)* 0 to  $\pm 3$  kV

*Output Voltage B* 0 to  $\pm 3$  kV (Phase B =  $[-1] \times$  Phase A)

*Offset Voltage (This feature can be disabled through the program)* Each DC output voltage (Phase A and Phase B) is ramped up and down with symmetrical rise and fall times, or they can be programmed with the user's custom clamping and declamping waveforms. The clamping process is initiated in response to the Clamp On/Off control. The polarity of each output reverses to the opposite polarity after each Clamp On/Off cycle.

**Output Waveshape** Each DC output voltage (Phase A and Phase B) is ramped up and down with symmetrical rise and fall times, or can be programmed with the user's custom clamping and declamping waveforms

**Output Voltage Range** 0 to  $\pm 3$  kV DC, maximum

**Output Current** 0 to  $\pm 6.5$  mA DC with peak capability of 10 mA

### Input

**Setting the High-Voltage Amplitude** HV magnitude can be controlled either externally or internally to the unit

**Setting the Offset Voltage** Offset voltage may be controlled externally or internally to the unit

### Output Voltage Monitor (Back Panel Connector)

**Scale Factor** 1 V/300 V

**Phase B DC** Accuracy better than 0.5% of full scale

**Offset Voltage** Less than 10 mV

**Output Noise** Less than 50 mV rms\*

### Steady State Voltage Leakage Current Monitor

**Scale Factor** 1 V / 1  $\mu$ A

**DC Accuracy**  $\pm 0.1$   $\mu$ A

**Output Noise** Less than 50 mV rms\*

### Features

**Interlock** Connections are provided to support an interlock safety configuration. In the event that the interlock is open, the high-voltage generation circuits are shut down

**Digital Display** 40X2 LCD character display shows various system functions such as Set Voltage, Output Voltage and Capacitance Monitor

### Features

**Clamped Wafer Detection Feature (Thresholds are set by the program)** To indicate wafer clamping events, the capacitive currents generated by a low voltage sine wave, super-imposed on the Phase A and Phase B outputs, are monitored but can be disabled through the program. The super-imposed waveform is used to indicate a no wafer, wafer present or wafer clamped status

**Capacitive Load Select** Clamped capacitance status range can be selected by the program for 0 to 10, 20 or 30nF (phase to phase) depending on the system and electrostatic clamp physical configurations

### Mechanical

**Dimensions** 88.1 mm H x 431.8 mm W x 531.9 mm D (3.47" H x 17" W x 20.9" D) 1U rack enclosure

**Panel Width** 482.6 mm (19")

**Weight** 11 lbs (5.0 kg)

**Connectors** 15-pin "D" ITT Canon used by remote device to control/monitor the unit, 9-pin "D" ITT Canon RS-232, 3-Pin FCT "D" High-Voltage, standard type-A USB, Ethernet (optional) and Front Panel

**Power ON/OFF** 2-position rocker switch

### Operating Conditions

**Temperature** 0°C to 35°C (32°F to 104°F)

**Relative Humidity** To 85%, noncondensing

**Altitude** To 2000 meters (6561.68 ft.)

### Electrical

**DC Input Receptacle** 2.0 mm locking DC jack; center contact is positive and shell is negative (receptacle mates with Switchcraft S761K plug)

**Ground Receptacle** Ground stud

**Power Requirements** 24 V DC, 2.0 A

### Supplied Accessories

**Operator Manual, SW** PN: 24013

**USB Cable** PN: BA103  
**HV Connector** PN: B8076R

**DC Plug (Switchcraft S761K)** PN: BA119R

**Line Cord, Fuses** Selected per geographic destination

### Optional Accessories

**90-264 V AC to 24 V DC Power Adapter** PN: IK045

### Note

Trek Model 645, a  $\pm 2$  kV model version of the instrument, is also available. Please contact the factory for more information

\*Measured using the true rms feature of the HPModel 34401A digital multimeter

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