VectraElite™
Automated Wave Soldering System
Engineering Data Sheet

CAUTION  The chemicals used with this equipment must be compatible with the following materials:
Teflon, Nylon, PVC, CPVC, polyethylene, polypropylene, polyurethane, Buna-N, Delrin, silicon,
bronze, stainless and galvanized steel, cast iron, and titanium.
Failure to use compatible thinners, fluxes, cleaners, and other chemical materials with this system will
void the warranty.

I. Fluxer Module

FLUXER MODULE FEATURES
ServoSpray™ Fluxing System
– See ServoSpray™ Engineering Data Sheet (EDS) for more information.
– Flux tanks must be pressurized with nitrogen when using alcohol based VOC fluxes to prevent fire hazards.

FLUXER MODULE OPTIONS
ServoJet™ Fluxing System
– In lieu of ServoSpray™. See ServoJet™ Engineering Data Sheet for more information.
Conveyor Rail Load Extensions for Load End
– Used with external fluxer.

FLUXER MODULE OPTION SPECIFICATIONS
– Load End Extensions 645 mm (25.4 in.)

II. PREHEAT MODULE

PREHEAT MODULE FEATURES
– Preheater tunnel enclosed with pyroceramic glass preheat covers
– Accommodates up to six feet of preheat
– Slide out bottom drawers and lift off top panels provide access to heater surface for cleaning and removal
– Adjustable bottom drawers provide process bottom side clearance from ½ in. to 2 in.
– Closed loop temperature control
– Interchangeability between radiant and Vectaheat™ preheaters
– Quick disconnect plug
– High/low temperature alarm (audio/visual)
– Two (2) bottom Vectaheat™ Modules standard to the VectraElite™ system

PREHEAT MODULE SPECIFICATIONS
Vectaheat™
– Maximum temperature 204°C (400°F)
– Max temperature variation ± 2.2°C (± 4°F)
– Blower capacity 4.5 m³/h (160 SCFH) per blower @ 0 mm (0 in.) of H₂O;
Two (2) blowers per unit
– Maximum power requirements 12.2 kW per heater
– Warm up time ≈ 10 minutes

PREHEAT MODULE OPTIONS

NOTE  Up to three (3) preheat zones, each zone accommodates one bottom and one top side heater. Note that
an upper preheater is not available for Zone 3. See preheater descriptive information for any
restrictions to maximum number of preheaters. Utilization of Zone 3 requires an external flux unit.
Bottom heaters are available in two types, radiant preheat or forced convection (Vectaheat™). Top heaters are available in two types, radiant preheaters or High Velocity Convection (HVC). Multiple top HVC preheats may require additional machine exhaust to limit machine maximum internal temperatures.

IR Preheater
- Up to three (3) bottom side preheaters
- Up to two (2) top side preheaters

Vectaheat™
- Additional bottom side Vectaheat™ forced convection heater (total of three [3])
- Blower failure alarm
- Solder spill detection inside heating unit
- See Specs above

HVC Preheater
- Up to (2) Topside High Velocity Convection preheaters.
- Blower failure alarm
- Note: HVC preheater is not available as a zone 3 option

PREHEAT MODULE OPTION SPECIFICATIONS

**IR**
- Maximum temperature 566°C (1050°F)
- Max temperature variation ± 2.2°C (± 4°F) at idle conditions
- Radiant heater 12 elements
- Maximum power requirements 12.0 kW per heater
- Heater element lengths 530 mm (21 in.)
- Warm up time Approximately 15 minutes

**High Velocity Convection (HVC)**
- Maximum temperature 232°C (450°F)
- Max temperature variation ± 2.2°C (± 4°F)
- Maximum power requirements 10 kW per heater
- Warm up time Approximately 10 minutes
- Blower capacity 8.5 m³/h (300 SCFH) per blower @ 0 mm (0 in.) of H₂O;
  Two (2) blowers per unit

Note: HVC available for upper preheater positions 1 and 2 only. Conveyor incline limited to 6-7 degrees.

III. WAVE SOLDER MODULE

WAVE SOLDER FEATURES

**Lead-Free Compatibility**
- All nozzles, pumps and flow ducts in contact with solder, are stainless steel and coated to resist tin (lead free) corrosion. Under typical conditions, the expected life of the solder module components is 2-5 years. Life of this coating is dependent upon the process, process chemicals, and hours of operation per week. Cleaning the solder pot components with methods that scratch the protective coating is discouraged and will void the warrantee.

**Solder Pot**
- High capacity cast iron solder pot
- Two (2) easily removable radiant panel heaters (one per each side of solder pot)
- Solder spill catch tray
- Automatic start/stop (intermittent) of solder wave(s)
- Adjustable legs for height and level control
- Motorized solder pot roll out
- Actuator for smooth operation and accessibility
- Fold down roll out stand fits inside machine when not in use
- Roll out limit switch signal and mechanical safety stop in maximum in and out positions

*Solder Pot (cont.)*
Motorized solder pot jacking stand
- AC motor with variable frequency control
- Position feedback via linear transducer
- Upper limit switch signal and mechanical safety stop, lower limit mechanical safety stop
- Manual crank feature with mechanical safety stops at the maximum up and down positions

**Temperature Alarms**
- High/low temperature protection and process alarm (audio/visual)
- Programmable high temperature alarms
- Low temperature protection for solder pump
- High temperature protection via bi-metal switch
- Closed loop temperature control (PID)

**Pump and AC Pump Motor**
- Low maintenance pump
- Independent pump and flow duct assemblies
- Pump bearings mounted above solder level providing extended maintenance schedule
- AC pump motor, variable frequency control
- 300W (0.4 hp), 230V/3PH, 715 to 1720 RPM, Inverter Duty
- Accuracy of control
  - ±3 RPM on the motor
  - ±1 RPM on the pump

**UltraFill™ Nozzle**
- Dual Wave with Nitrogen
- Inert Lambda-style nozzle with Rotary Chip.
- Distance between waves <95 mm (3.75 in.)
- Nitrogen shroud with diffusers, designed for ease of maintenance.
- Nozzle curve plates, dross plates and other key wear components manufactured from Titanium
- Nozzle cores attached to ducts with quick disconnects
- Suitable for Air operation by simply turning Nitrogen Off
- Dross production with Nitrogen equivalent or less than the dual wave coN2tour® system
- Dross production with Nitrogen Off equivalent or less than the dual wave Lambda
- Typical Nitrogen flow 800 SCFH
- Nitrogen boundary purity: <10 ppm O2
- Available with Single Wave Version

**Rotary Chip Wave Nozzle**
- Improves hole fill and reduces skips
- Reciprocating wave pattern perpendicular to process path displaces entrapped gasses
- AC motor with variable frequency control

**WAVE SOLDER SPECIFICATIONS**

**Solder Pot**
- 6.35 mm to 12.7 mm (¼ in. to ½ in.) deep wave
- Maximum solder temperature
  - 288°C (550°F) Standard
  - 302°C (576°F) With Lead Free enabled
- Warm up time: 3 - 4 hours from ambient to 260°C (500°F)
- Heaters: 6.3 kW per heater
- K-type thermocouples
- Maximum temperature variation ± 1°C (±2°F) at idle conditions
- Thermostat for high temperature safety shut down between 310°C to 330°C (590°F to 626°F)
- Solder pot capacity:
  - Single wave configuration: 840 kg (1850 lbs.)
  - Dual wave configuration: 820 kg (1810 lbs.)
  - Cast pot material: 730 kg (1610 lbs.)
  - Tin/Lead 63/37 Solder
  - Tin based (<96%) Lead Free Solder

**AC Jacking Stand Motor**
- 250W (1/3 hp), 230V/3Ph, 173 RPM, 12.3 N-m (109 in-lbs.)
Ultrafill™ Nozzle

Nitrogen Consumption
- Load end chip N2: 4.2 m³/h (150 SCFH) max.
- Diffuser between Chip & Lambda: 4.2 m³/h (150 SCFH) max.
- Upper unload Lambda: 9.9 m³/Hr. (350 SCFH) max
- Lower unload Lambda: 4.2 m³/Hr. (150 SCFH) max

Rotary Chip Wave Nozzle
- Rotary speed: 75-300 RPM ± 0.5 RPM
- Chip wave nitrogen consumption
  - Load side diffuser: 4.2 m³/h (150 SCFH) max.
  - Unload side diffuser: 4.2 m³/h (150 SCFH) max.

WAVE SOLDER OPTIONS

Solder Pot
- Titanium components
  - All solder pot internal components, including hardware, in contact with solder manufactured from Commercially pure Titanium Grades 1, 2, 3, or 4. Under typical conditions the expected life of titanium solder module components is the life of the machine.
- Solder level Sensor/low level alarm
  - Monitors and alarms if solder level drops 1.5 mm (1/16 in.) below setpoint
- Solder Bar Feeder with solder level sensor
  - Bar capacity, holds 16 bars weighing up to 1 kg (2.2 lb.)
- Poka-Yoka Solder Bar Feeder with solder level sensor
  - Accepts triangular lead-free solder bars meeting Electrovert specifications
- ExactaWave™ Closed Loop Wave height control
  Note: Installation of this option reduces the maximum process width by 1.0 in. (25.4 mm). Contact factory if full process width is required.
  - The control range is -.240 inches below the V of the conveyor fingers to .220 inches above.
  - A minimum board spacing of eight inches is required for accurate control of the wave.
  - Pallets offsetting the PCB upward above the plane of the fingers will cause the sensor to be immersed in the wave damaging the sensor.
IV. CONVEYOR MODULE

CONVEYOR MODULE FEATURES

Finger Conveyor
- Titanium V-groove fingers and L-fingers intermix
  - Three (3) Thompson precision linear bearing cross shafts to ensure parallelism of the conveyor
  - Rugged double roller chains supported inside extruded rails provide for smooth product transport
- Manual Width Adjust
  - Hand wheel at load end of conveyor
- Load Guides and Chain Guards
- Return conveyor provided under machine frame
- AC drive motor, with variable frequency control
- Manually adjustable incline conveyor (5°-7°)

Note: This feature is not fully compatible with the High Flexible Velocity convection (HVC) preheater option – conveyor angle range 6° - 7°.

Finger Cleaner
- Low liquid level alarm
- Brushes clean fingers full length at front and exposed lower half at rear
- Fluid containment area minimizes external exposure
- Finger cleaner pump motor:
  - Dry run capability, self priming
  - Polypropylene connectors, Viton O-rings and valves
  - Flow rate 1.7 liters/min. (0.5 gpm)
- Polyurethane and PVC feed and drain lines
- Finger cleaner reservoir maximum capacity: 17 liters (4.5 gal)
- Finger cleaner low liquid level alarm.

CONVEYOR MODULE SPECIFICATIONS

Conveyor
- Adjustable process width: 50 mm to 457 mm (2.0 in. to 18.0 in.)
- Process conveyor speed: 0.30 m/min - 3.66 m/min (1.0 fpm – 12.0 fpm)
- Process topside clearance: 102.0 mm (4.0 in.)
- Double chain aluminum extrusion conveyor rail:
  - Hard coat anodized 0.05 mm - 0.08 mm (0.002 in. - 0.003 in.) thick
  - Military spec A8625 Type III Class I
- Maximum conveyor loading 45.36 kg (100 lb.) evenly distributed throughout the conveyor length

Conveyor Drive AC Motor
- 90W (1/8 hp), 230V/3PH, 20 RPM, 52 N-m (350 in-lb.), inverter duty
- Motor controller: (1/2 hp) with RS422 for computer control and diagnostics
- Accuracy of control 1% of maximum speed

Conveyor Width Adjust AC Motor
- 40W (1/8 hp), 230V/3PH, 120 RPM, 3.1 N-m (27 in-lb.)

Return Conveyor Provision
- 72.6 cm (30 in.) maximum width available for return conveyor system
- Compatible with external fluxer option
- Return conveyor provision is below machine frame (see illustration)
CONVEYOR MODULE OPTIONS

- Preferred Equipment Package 1
  - Computer controlled Motorized Width Adjust
    - 40W (1/19 hp), 230V/3PH, 120 RPM, 3.2 N-m (28 in-lb)
    - Hand wheel for manual backup
    - Width Adjust Lead Screw Covers
- Exit Cooling Fans
  - Configured at the unload end, mounted under the conveyor rails
  - Lowers the temperature of the PCB’s as they exit
  - Consists of four (4) 115 VAC fans
  - Height and angle adjustable

V. FRAME AND ENCLOSURES

FRAME AND ENCLOSURE FEATURES

- Two Emergency Stops at front of machine
- Low Air Pressure Switch
- Interior Hood Lights
  - Lights removable and contain magnetic base for repositioning
- Personnel Ground Strap Plugs
  - Load end
  - Unload end
  - Electrical enclosure
- Exhaust Interlocks
- Tool Kit
- Stainless steel removable Deck Pans
  - Aids in containing and cleaning spills
  - Easily removable for quick cleaning
  - 3 pans provided under internal fluxer, preheat, and exit interior of machine.

FRAME AND ENCLOSURE SPECIFICATIONS

- Exhaust Requirements
  - Two (2) 208 mm (8 inch) exhaust ports:
    - PORT 1: (Load End) 765 m3/hr (450 SCFM)
    - PORT 2: (Unload End) 1104 m3/hr (650 SCFM)
  - Allow for 33.0mm (1.3 in) of H₂O static pressure drop at machine
- Air Requirements (Required for some options)
  - ½ in. FNPT inlet fitting
  - 415 kPa – 830 kPa (60 psig – 120 psig)
  - Must be dry and oil free
  - Consult individual option specifications for flow requirements
- Nitrogen Requirements (Required for some options)
  - ½ in. FNPT inlet fitting
  - 415 kPa – 830 kPa (60 psig – 120 psig)
  - Consult individual option specifications for flow requirements

FRAME AND ENCLOSURE OPTIONS

- Preferred Equipment Package 2
  - User programmable Light Tower to indicate machine status and alarms
  - Two (2) additional E-Stops

VI. CONTROLS FEATURES

CONTROLS DESCRIPTION

- Pentium processor
- Windows XP® Pro operating system
- Animated 3-D graphical user interface
- Operator interface with LCD 17in flat screen monitor
  - Full function keyboard with point device
- Internal hard drive and 3-½ in. floppy disk
- Recipe storage for 5000+ unique recipes
- On screen help
- Parallel printer port on PC
- Ethernet Card
- Serial port on PC
  - Multitasking with third party programs such as thermal profiling
- Two (2) front mounted emergency stop switches at load and unload ends
- Discrete wiring of sensors and switches with emphasis on quick connect capability
  - Main power disconnect
  - Control circuit 24 VDC and 120 VAC
  - Input sensor for board count and tracking
  - Thermocouple failure detection
- Motor drive controllers serial communication through RS422 for computer control and diagnostics

**CONTROLS OPTIONS**

**SOFTWARE OPTIONS**
- SMEMA Equipment Interface
  - Includes Output Photocell

**NOTE**  Due to the continuous nature of the wave solder process, the system cannot be stopped if the downstream equipment is “busy”.

**VII. CODES/COMPLIANCE**

*Note:* UL Listing and CE Compliance are mutually exclusive. Choose only one at time of order.

**UL LISTING**

**Underwriters Laboratory (UL)**
- Listed for Factory Automation Equipment, File # E181408
- Testing based to specifically include:
  - Standard for Industrial Control Equipment, Part 1. UL 508
  - National Electrical Code (NEC), ANSI/NFPA 70-93
  - Electrical Standard for Industrial Machinery, NFPA 79-91

**CODES/COMPLIANCE OPTIONS**

**CE Compliance (European)**
- Must choose at time of order
- Declaration of Conformity is based on compliance to:
  - Machinery Directive 89/392/EEC
  - Amendment to include EMC Directive 93/68/EEC
  - EMC Directive 89/336/EEC and on the following European Harmonized Standards:
    - EN 292-1 (Basic concepts, general principles for design, basic terminology, methodology)
    - EN 292-2 (Basic concepts, general principles for design, technical principles and specifications)
    - EN 1127 (Explosion prevention and protection)
    - EN 60204-1 (Electrical equipment of machinery)
    - EN 55011 (Limits and methods of measurement of radio disturbance - emissions)
    - EN 50082-2 ( Electromagnetic compatibility - immunity)
VIII. PHYSICAL CHARACTERISTICS

- Frame fabricated from rugged welded tubular steel
- Cabinet exterior made from cold rolled steel
- Machine dimensions: See attached machine drawings
- Noise levels: Measured at 1 meter height and 1 meter from machine (ambient 65 dbA)
  - Front 65 dbA
  - Rear 65 dbA
  - Load End 71 dbA
  - Unload End 72 dbA

IX. SHIPPING INFORMATION

- Machine Weight 2096 kg (4620 lbs.)
- Skid Size 526mm x 198mm x 203 mm (207 in. x 78 in. x 80 in.)
- Machine Weight w/Skid 2413 kg (5320 lbs.)
- Crate Size 528mm x 201mm x 223mm (208 in. x 79 in. x 88 in.)
- Machine Weight w/Crate 2867 kg (6320 lbs.)

NOTE: The Full Crate Option is required for Export (Optional for North America)

X. ELECTRICAL REQUIREMENTS

- Standard 440-480 VAC, 3 phase, 60 Hz (4 wires: 3 phase, ground)
- Optional 380-415 VAC, 3 phase, 50 Hz (5 wires: 3 phase, neutral, ground)
  (Note: Contact factory for optional system electrical requirements and availability)

- Full load start-up power consumption configured with 2 Vectaheat™ preheaters:
  - 43.2 kW
    - Add 12.2 kW for each additional Vectaheat
    - Add 12 kW for each additional Infrared
    - Add 10 kW for each HVFC

- Power:
  @380 VAC @440 VAC
  - Base configured with 2 Vectaheat™ preheaters 66 amps 52 amps
  - Add for each optional Vectaheat™ preheater 19 amps 15 amps
  - Add for each optional IR Preheater 18 amps 15 amps
  - Add for each optional HVFC preheater 15 amps 12 amps

The values given are maximum power consumption at full load start-up. Power consumption is considerably lower at stabilized process conditions, but varies based on process parameters and product loading, systems typically will draw 40-60% of full load value at steady state operating conditions.

The machine is equipped with a non-fused main disconnect switch. It is recommended that main power be brought to the machine via a wall-mounted fused disconnect in accordance with local codes.

NOTE: European Customers: To comply with EMC Directive 89/336/EEC on electromagnetic compatibility, power cables to the machine must be run in rigid or flexible metal conduit.

X. DOCUMENTATION

STANDARD FEATURES:
- Documentation Set: Includes one (1) set of manuals, bill of materials, and electrical schematics in CD ROM format.

OPTIONS:
- Additional User Manuals Set – includes one (1) additional set of complete machine user manuals in either printed or CD ROM format
- Additional Documentation Set – in either printed format or CD ROM format. Includes the Bills of Materials and Electrical Schematics in addition to the User Manuals.

NOTE: Printed Manuals/ Documentation Packages are priced higher than electronic CD ROM format.
Front View with External Fluxer Cabinet
Top View with External Fluxer Cabinet