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More Information...

APR Array Package Rework System



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View APR-5000 Promotional Video (26,000 KB):
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Redefining Array Package Rework

The APR-5000 Series Array Package Rework Systems embody the spirit and ingenuity of Metcal. In sleek designs, Metcal engineers have incorporated state-of-the-art vision, and closed-loop time, temperature and airflow control. Precision placement and powerful software make the rework of complex array packages easy, fast and extremely reliable.

Economical and easy to use, the APR-5000 Series Array Package Rework Systems deliver high-end BGA/CSP functionality, moving far beyond expensive rework machines by offering unparalleled performance at an affordable price with the precision that is engineered into every Metcal system.

The Industry Standard



All machines in the APR-5000 Series Array Package Rework Systems share the same design intelligence, incorporating the ideal combination of essential hardware features and automated software necessary for reworking today's array packages.

Closed-loop, computer-controlled time, temperature and airflow parameters help to guarantee process control and repeatability. Easy-to-program software manages the five stages of the reflow profile: pre-heat, soak, ramp, reflow and cooling. In addition, board temperature can be monitored using integrated flying thermocouples. Real-time adjustments can be made to all parameters while the profile is running.

To help guarantee uniformity and higher process yields, the APR-5000 Series Array Package Rework Systems employs a revolutionary single reflow/placement head that moves to the correct position for rework, thus allowing the PCB to remain stationary during the process. Plus, the PCB is centralized relative to the pre-heaters to provide superior uniformity of PCB temperature during rework. The enhanced software is instructive and intuitive, walking the engineer through the steps of process development and then instructing the operator to ensure consistent, repeatable execution of the automatic profile functions.

Compact, Powerful , Intelligent



Design and functionality come together in the APR-5000 Array Package Rework System. Developed in direct response to current production needs and future industry trends, the APR-5000 Array Package Rework System provides closed-loop control, optimized vision and precise component placement in an ergonomically designed compact platform, just 19" x 30" (483mm x 762mm). Capable of handling boards up to 9" x 15" (229mm x 381mm), with a placement accuracy to 0.001" (0.025mm) and interconnection pitches as low as 0.012" (0.3mm), the APR-5000 Array Package Rework System is ideal for reworking smaller assemblies, such as cell phones and laptop computers, at a very competitive cost.

In addition, the APR-5000 Array Package Rework System uses standard mains voltages and self-contained pumps rather than special wiring and shop air. This allows the system to be set up and moved to any bench, without having to be fitted/plumbed in by an engineer.

The APR-5000 Array Package Rework System is designed for the long term, with the ability to pre-heat boards uniformly, even those with lead-free solders, and deliver the higher solder melt temperatures necessary to rework lead-free assemblies.



Seeing Is Believing

When it comes to reworking BGAs, CSPs, Land Grid Arrays (LGAs), Micro SMDs, Micro-Lead Frames (MLFs) and Bumped Chip

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Components, an important key to success is vision; the ability to see, align and accurately place components.

It's here that the APR-5000 Array Package Rework System excels. The system incorporates Metcal's exclusive integral vision system that makes accurate component placement easy to achieve, allowing operators to simultaneously view the topside of the PCB and a superimposed image of the underside of the component. With micrometer adjustment, images can be accurately aligned in the X, Y & Theta axes prior to placement. In addition, integrating the vision system with the machine's software eliminates the need for multiple monitors.

Large Board Capability, Small Board Precision



The APR-5000-XLS Array Package Rework System establishes a new benchmark for the precise, cost-effective rework of the widest range of PCBs and component types, from large boards up to 24.5" x 24.5" (622mm x 622mm) to components down to 0.020" x 0.010" (0.51mm x 0.25mm).

Flexible enough to perform flawlessly with various sized PCBs, the APR-5000-XLS Array Package Rework System incorporates dual stage pre-heaters and has the thermal capacity and control to execute precise profiles of both large and small PCBs, delivering uniform temperature control horizontally, across the surface of PCBs up to 0.25" (6.35mm) thick, and vertically between the die and ball of the reworked component.

Closed-loop, computer-controlled parameters of time, temperature and airflow guarantee process repeatability and precision, even at the higher temperatures demanded by lead-free soldering.

Motorized X, Y, Z adjustments speed placement and help guarantee flawless process repeatability. In addition, motorized Theta axis provides 360° rotation to simplify component orientation. Together, these advanced controls reduce operator fatigue, improve placement accuracy and offer the industry's highest level of process consistency.

New to the APR-5000-XLS Array Package Rework System is Metcal's innovative Split Vision System, which allows operators to view the opposite corners of a component, including splitting on rectangular components, with the necessary magnification to make its placement and registration fast and accurate.



Lead-Free Compatible

As the implementation of lead-free assemblies intensifies and product designs change, the APR-5000-XLS Array Package Rework System has the power, size and sophistication to meet the required higher, cost-sensitive performance criteria.

The ingenious Metcal single reflow/placement head design helps achieve a consistent, tight Delta T across the board and the component. Thermal damage is precluded due to the system's precisely controlled pre-heaters; lead-free profiles can be quickly developed via the system's five thermocouples; and closed-loop, computer controls and intuitive software help operators maintain the ideal process from start to finish.

The APR-5000-XLS Array Package Rework System provides full convection in both reflow heater and dual stage pre-heaters to provide fast ramp and precise peak reflow temperature without thermal damage to sensitive components unsuitable for heating above 240°C. And with four heating zones and one cooling zone, the precise profiles needed for successful soldering/desoldering of lead-free packages are easily delivered.

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TECHNICAL SPECIFICATIONS		
Input Voltage	**APR-5000** 100-240 VAC, 50/60 Hz Single Phase	**APR-5000-XLS/XL** 200-240 VAC, 50/60 Hz 20 Amp Single Phase
Power Consumption		
System Total	2200 W	3500 W
Pre-Heater	1400 W	2800 W
Inner Zone		1400 W
Outer Zone		2800 W
Reflow Heater	550 W	550 W
Temperature Control Type	Closed-Loop Control (RTD Sensors)	Closed-Loop Control (RTD Sensors)
Maximum Source Temperature		
Reflow Head	450 °C (842 °F)	450 °C (842 °F)
Pre-Heater	350 °C (662 °F)	350 °C (662 °F)
Airflow		
Control	Pre-Set to 8,16 & 24 l/min	Pre-Set to 8,16 & 24 l/min
Supply	Self-Contained Pump	Self-Contained Pump
Optional Nitrogen Input	Standard Feature	Standard Feature
Component Handling		
Maximum Size	1.4" x 1.4" (35mm x 35mm)	2.2" x 2.2"* (56mm x 56mm) 1.4" x 1.4"** (35mm x 35mm)
Minimum Size	0.020" x 0.010" (0.51mm x 0.25mm)	0.020" x 0.010" (0.5 1 mm x 0.25mm)
Maximum Weight	55g (1.94oz)	55g (1.94oz)
PCB Handling Capability		
Maximum Size	15" x 9" (381mm x 229mm)	24.5" x 24.5" (622mm x 622mm)
Rework Area	9" x 12" (229mm x 305mm)	22.5" x 24.5" (572mm x 622mm)
Maximum Thickness	0.25 "(6mm)	0.25 "(6mm)
Vision		
Maximum Field of View	1.4" x 1.4" (35mm x 35mm)	2.2" x 2.2" (56mm x 56mm)
Minimum Size Array	0.020" x 0.10" (0.51mm x 0.25mm)	0.020" x 0.10" (0.51mm x 0.25mm)
Split Field (APR-5000-XLS)		Corner crossover on large component
System Dimensions		
W x D x H	19" x 30" x 30" (483mm x 762mm x 762mm)	36" x 36" x 33" (914mm x 914mm x 838mm)
Weight	130lbs (59Kg)	220lbs (100Kg)

SYSTEMS
APR-5000 100-240 VAC Array ackage Rework System
APR-5000-XLS 200-240 VAC Array ackage Rework System
APR-5000-XL 200-240 VAC Array ackage Rework System
Systems will be configured with desktop PC and monitor. Final pricing will depend on configuration and language version.

SYSTEMS INCLUDE	
VNZ-19	Vacuum Pick-Up Nozzle 19mm O/D**
VNZ-12	Vacuum Pick-Up Nozzle 12mm O/D
VNZ-08	Vacuum Pick-Up Nozzle 8mm O/D
VNZ-05	Vacuum Pick-Up Nozzle 5mm O/D
VNZ-03	Vacuum Pick-Up Nozzle 3mm O/D
VNZ-01	Vacuum Pick-Up Nozzle 1mm O/D
FS-APR	PCB Support Finger Short (4 included)*
FSS-APR	PCB Support Finger Short (8 included)**
FSL-APR	PCB Spring Support Finger Long (4 included with APR-5000,8 with APR-5000-XLS/XL)
UBS-APR	Under Board Support*
UBS-APR-XL	Under Board Support**
21104	Fine Gauge Thermocouples (3 included with APR-5000, 5 with APR-5000-XLS/XL)
19782	Adjustable BGA Centering Nest**
20987	Adjustable CSP Centering Nest
20534	Squeegee Blade Holder for rinting
SOFT-APR-5000	Installation Software*
SOFT-APR-5000-XL	Installation Software**
Tools	Tools for Calibration & Adjustment
Cables	Power,Communication &Video Cables

(*APR-5000, **APR-5000-XLS/XL)

OPTIONAL ACCESSORIES	
FS-APR-2	PCB Support Finger Short (Pack of 2)
FL-APR-2	PCB Support Finger Long (Pack of 2)
FSL-APR-2	PCB Spring Support Finger Long (Pack of 2)
FSS-APR-2	PCB Spring Support Finger Short (Pack of 2)
FLS-APR-2	Large PCB Finger Short (Pack of 2)
FLL-APR-2	Large PCB Finger Long (ack of 2)

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System Warranty	1 Year (Excluding Consumables)	1 Year (Excluding Consumables)
Agency Approvals	CE cETLus	CE cTUVus GS

(*APR-5000-XLS,APR-5000-XL)**

FLSS-APR-2	Large PCB Spring Finger Short (Pack of 2)
FLSL-APR-2	Large PCB Spring Finger Long (Pack of 2)
UBS-APR	Under Board Support APR-5000
UBS-APR-XL	Under Board Support APR-5000-XLS/XL
APR-DK1	Demonstration PCB with BGA & CSP Component Kit
TF-1	Feeder for Picking Components from 8mm Tape
PF-1	Print reparation Plate
VAC-P100	Self-adhesive plates for removal of non-uniform components

Nozzles

There is a comprehensive range of standard reflow nozzles available to suit the most common array packages. In addition, Metcal offers the flexibility of custom manufactured nozzles for unusual or odd shaped components, such as EMI shields and plastic surface mount connectors. Please contact your local Metcal representative for details.

REFLOW NOZZLES	
Part No.	**Description**
APR-NK	APR-5000 Nozzle Kit (*includes 1 of each)
APR-NK-CSP	APR-5000 CSP and Micro SMD Nozzle Kit(**includes 1 of each)
NZA-490-490*	APR Reflow Nozzle 49mm x 49mm
NZA-450-450	APR Reflow Nozzle 45mm x 45mm
NZA-400-400*	APR Reflow Nozzle 40mm x 40mm
NZA-350-350*	APR Reflow Nozzle 35mm x 35mm
NZA-300-300	APR Reflow Nozzle 30mm x 30mm
NZA-270-270*	APR Reflow Nozzle 27mm x 27mm
NZA-230-230*	APR Reflow Nozzle 23mm x 23mm
NZA-200-200**	APR Reflow Nozzle 20mm x 20mm
NZA-180-180***	APR Reflow Nozzle 18mm x 18mm
NZA-150-150**	APR Reflow Nozzle 15mm x 15mm
NZA-130-130***	APR Reflow Nozzle 13mm x 13mm
NZA-100-100***	APR Reflow Nozzle 10mm x 10mm
NZA-080-080**	APR Reflow Nozzle 8mm x 8mm
NZA-060-060***	APR Reflow Nozzle 6mm x 6mm
NZA-080-095***	APR Reflow Nozzle 8mm x 9.5mm
NZA-250-290	APR Reflow Nozzle 25mm x 29mm

(* 1 of each included in both kits)**

Component Stenciling Templates

Metcal has developed a new solder paste printing method, Component Stenciling Templates, for printing on the underside of components. This easy procedure is designed for use on PBGA, CBGA, CSP balled devices as well as Land Grid Array (LGA) components. Not only is this new process simple, it's also quick to perform and can increase

productivity four to five times in place of stenciling the PCB substrate. This is an ideal process for small components and situations where traditional stencil access is limited by the close proximity of adjacent components.

COMPONENT STENCILING TEMPLATES	
Part No.	**Array Package**
BST-169	169 Full Matrix Array
BST-225	225 Full Matrix Array
BST-256	256 Full Matrix Array
BST-256P	256 Perimeter Array
BST-256FP	256 Fine-Pitch Full Matrix Array
BST-272P+16	272 Perimeter Array With 16 Inner
BST-303	303 Full Matrix Array
BST-324	324 Full Matrix Array
BST-352P	352 Perimeter Array
BST-357	357 Full Matrix Array
BST-492	492 Full Matrix Array
CST-46	46 Ball Micro BGA
BRP-LDA16A	NSC LLP 16 Pin Dual In-Line
BRP-LQA16A	NSC LLP 16 Pin Quad
BRP-LQA24A	NSC LLP 24 Pin Quad
BRP-LQA44A	NSC LLP 44 Pin Quad

Dip Transfer

This process involves dipping a component into a known depth of gel flux, depositing an exact amount of flux. Flux dipping is quick, consistent and clean, and negates the need to clean after reflow. Metcal Dip Transfer sets are available for both solder balled and leaded devices. All kits are supplied with a metal spatula.

DIP TRANSFER ACCESSORIES	
Part No.	**Description**
DTP-BGA	Set of 3 plates, apertures 28, 35, &45mm, depth 0.012"(0.30mm)
DTP-CSP	Set of 3 plates, apertures 10, 16, &21mm, depth 0.006"(0.15mm)
DTBK-USMD	Kit, uSMD Flux Transfer Blocks, set of 2 blocks, depth 0.003" (0.08mm) and 0.004"(0.10mm)
DTBK-FC	Kit, Flip Chip Flux Transfer Blocks, set of 2 blocks, depth 0.001" (0.025mm) and 0.002"(0.051mm)

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