

VCA 4600 Series

Visual Contact Angle Flat Panel Display Surface Cleanliness Inspector

VCA system has been designed to provide precise, easy contact angle analysis for the vast majority of applications. However, there may be specific applications with custom requirements. In most cases we can design a solution and retrofit the existing platform to accommodate your specific demands. If you have any questions, comments, or suggestions, please call **AST Products, Inc.** at +1-978- 667-4500.

Revised March 9, 2004

VCA-4600 Series, the Next Generation Flat Panel Display Surface Cleanliness Inspector

The FPD industry had experienced explosive growth during the past few years. New FPDs move from R&D stage toward increasing panel sizes. From R&D to Tool Verification and from Quality Assurance to Product Validation, Visual Contact Angle VCA Analyzers from AST Products have been with our customers at the forefront of the tide from the very beginning.

For the Fast Growing Flat Panel Display Industry

Answering the demands of the FPD industry, VCA-4600 Series is a brand new series of products from the innovative minds of our VCA design team.

VCA-4600 Series evolves from a successful series of FPD Surface Cleanliness Inspector products that are already in routine services to the industry leaders and researchers, such as VCA-4000, VCA-4100, and VCA-4300.

Growing with Your Business

Designing around a standardized OC-46 Optical Carriage module, VCA-4600 Series provides different sizes of measurement stages and automation options to craft to your special needs. When it is time to move on to the next generation, the portable design of OC-46 Optical Carriage module allows re-innovation to a new platform with new automation options, saving capital costs, operator re-training costs, and operational overheads.



VCA 4600 Series

Visual Contact Angle Flat Panel Display Surface Cleanliness Inspector

2

VCA system has been designed to provide precise, easy contact angle analysis for the vast majority of applications. However, there may be specific applications with custom requirements. In most cases we can design a solution and retrofit the existing platform to accommodate your specific demands. If you have any questions, comments, or suggestions, please call **AST Products, Inc.** at +1-978- 667-4500.

Revised March 9, 2004

Carry Measurements to the Points of Interest

Unlike the old VCA-4000 design which has a stationary syringe head and a moving stage, **VCA-4600 Series** moves **OC-46 Optical Carriage** around the measurement stage. Movements of Optical Carriage carry measurements to the points of interest.

Non-stop Operations

With more points of measurement, the capacity of syringe becomes a bottleneck for continuous operations. **VCA-4600 Series** provides large-capacity syringes and an automatic refilling option for auto-refilling from a test-liquid reservoir. With 1,000 drops per refill, and 50 refills from the reservoir, **VCA-4600 Series** is virtually unstoppable all day long.

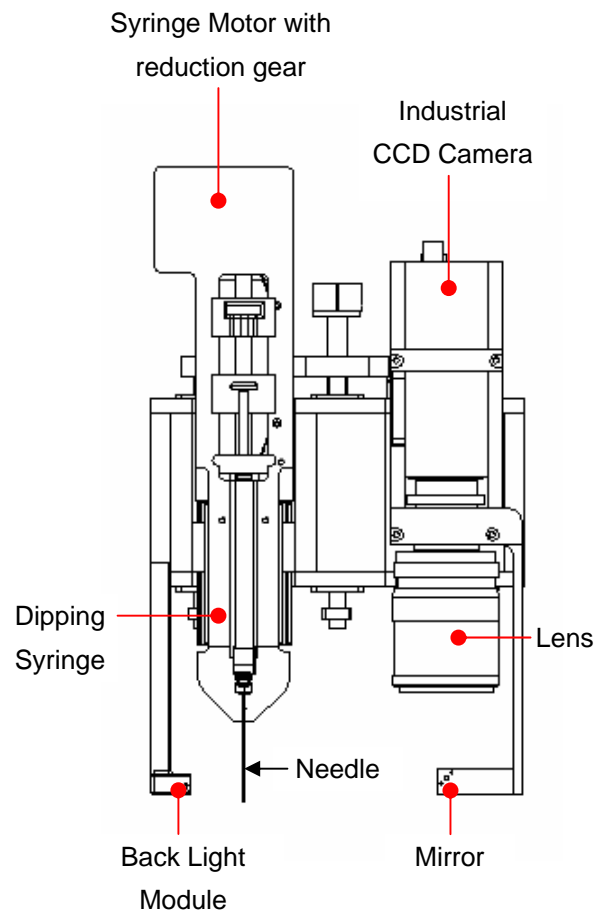
Saving Clean Room Space

With moving measurement head instead of stage, for panels of the same size, the precious clean room space occupied by a **VCA-4600** is only a quarter of moving-stage designs. When the size of panel increased by generations, why waste the clean room space?

Answer to the Wide-spreading, Low-contact-angle Measurements

Unlike its ancestors, **OC-46 Optical Carriage** is equipped with both motorized dipping motion and syringe plunging capabilities to answer an everyday wish of the FPD industry.

Since low-contact-angle surface quality is a fact of life to the FPD industry, measuring a wide-spreading drop requires dispensing very tiny drop volumes that will never leave the needle tip by pull of gravity. Through a motorized syringe that dispenses **accurate** and **repeatable** tiny drop volumes by the use of an 10-to-1 reduction gear, the motorized dipping motion of **OC-46 Optical Carriage** syringe assembly further separates a drop from the needle tip by surface contact instead of gravitational dropping enabling every tiny drop volume being accurately delivered.



VCA 4600 Series

Visual Contact Angle Flat Panel Display Surface Cleanliness Inspector

VCA system has been designed to provide precise, easy contact angle analysis for the vast majority of applications. However, there may be specific applications with custom requirements. In most cases we can design a solution and retrofit the existing platform to accommodate your specific demands. If you have any questions, comments, or suggestions, please call **AST Products, Inc.** at +1-978- 667-4500.

Revised March 9, 2004

The Heart and Pride

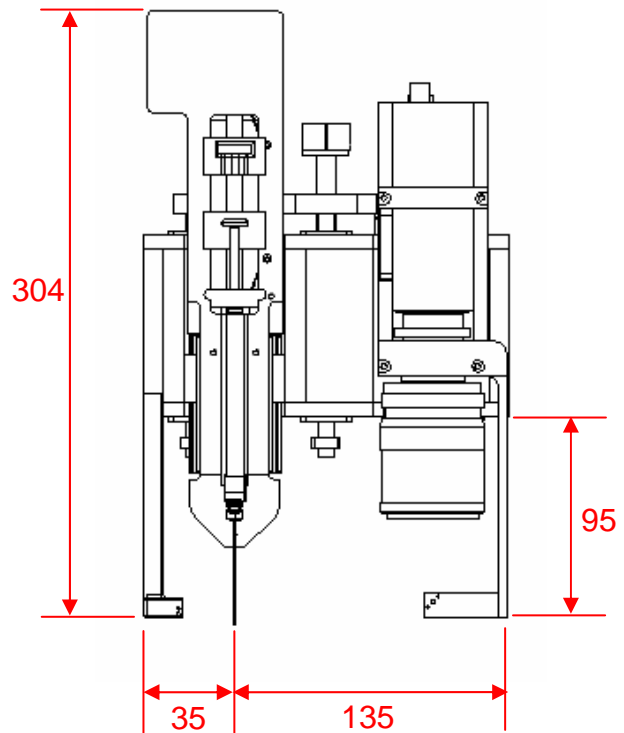
OC-46 Optical Carriage module is the heart and pride of VCA-4600 Series FPD Surface Cleanliness Inspector. All models in the VCA-4600 line incorporate OC-46 Optical Carriages into their very core.

The new compact design evolves from a long line of try-and-true ancestral designs, such as industrial-grade CCD camera, large-aperture lens, adjustable image reflection, LED back-lighting, all bearing-guided, no-particle moving parts, and portable design.

Portable design of an OC-46 Optical Carriage module enables a wide variety of applications and integrations. For inline applications, multiple Optical Carriages can be installed to fix locations and perform simultaneous measurements in one command. The throughput of such equipment can reach up to 5 seconds per piece.

External Dimensions	
Carriage width	170 mm
Carriage depth	110 mm
Overall depth	150 mm
Overall height	304 mm
Weight	4.75 kg

Syringe Assembly	
Needle to Light Module	35 mm
Needle to Reflecting Mirror	135 mm
Syringe Dipping Travel	2.5 mm



Installation	
Carriage elevation	10 mm
Minimum installation height above stage	95 mm
Minimum clearance above stage	0.05 mm

VCA 4600 Series

Visual Contact Angle Flat Panel Display Surface Cleanliness Inspector

VCA system has been designed to provide precise, easy contact angle analysis for the vast majority of applications. However, there may be specific applications with custom requirements. In most cases we can design a solution and retrofit the existing platform to accommodate your specific demands. If you have any questions, comments, or suggestions, please call **AST Products, Inc.** at +1-978- 667-4500.

Revised March 9, 2004

Automation Levels

VCA-4600 Series designates five different automation levels, **E, M, S, D, and X**, for customers with various degrees of factory automation needs.

Levels	Descriptions	Motorized Drive	Data Uploading	Syringe Refill
E	Easy Operations	S	Manual	Manual
M	Manual Operations	S, Y, D	Manual	Manual
ML	Manual with LPA	S, Y, D, L	Manual	Manual
S	Semi-auto Standalone	S, X, Y, D	Manual	Manual
SL	Semi-auto Standalone with LPA	S, X, Y, D, L	Manual	Manual
DL	Auto Slave with LPA	S, X, Y, Z, D, L	Auto Copy	Auto
XL	Auto Master with LPA	S, X, Y, Z, D, L	Browser	Auto

Note 1. **S**: syringe; **X**: gantry movement; **Y**: carriage movement; **Z**: carriage elevation; **D**: dipping motion; **L**: loading pin movement.

Note 2. **LPA**: Loading Pin Array. **M** and **S** models can be further configured to incorporate **LPA** to assist loading and unloading of panels. For **DL** and **XL** models, **LPA** is a standard feature. There is no provision for an **E** model to install **LPA**.

E Level for Easy Operations

This level is an entry level of VCA-4600 Series. Only the syringe drive is motorized. This model is available only for smaller stage/desktop designs. Operators can easily move Optical Carriage by hands to the point of measurement.

M Level for Manual Operations

Press-to-run motorized movements for Optical Carriage to move along the gantry and for syringe assembly to dip a drop. A carriage movement control button is located at the gantry and the dipping motion of syringe assembly is controlled via the keyboard of workstation.

S Level for Auto Positioning Operations

This level incorporates motorized gantry motion enabling automatic 2D positioning capability of the carriage. S level allows users to supply coordinates in a sequencing file, perform measurements at the given point, and visualizes spatial distribution of values in 3D charts.

D Level that Dedicates to a Robotic Loader

With motorized elevation control, this model has 3D mobility that can automatically refill the syringe at home position. This level also provides a two-level digital signal interface for an external commanding device to coordinate transfers of work pieces with a robotic loader.

X Level that Integrate a Robotic Loader

This level integrates a user-provided robotic loader and a browser-based work scheduler and data retrieval system. This level also contains the same hardware and controls as a D-level model thus can be upgraded from such and further developed into a mastering station.



VCA 4600 Series

Visual Contact Angle Flat Panel Display Surface Cleanliness Inspector

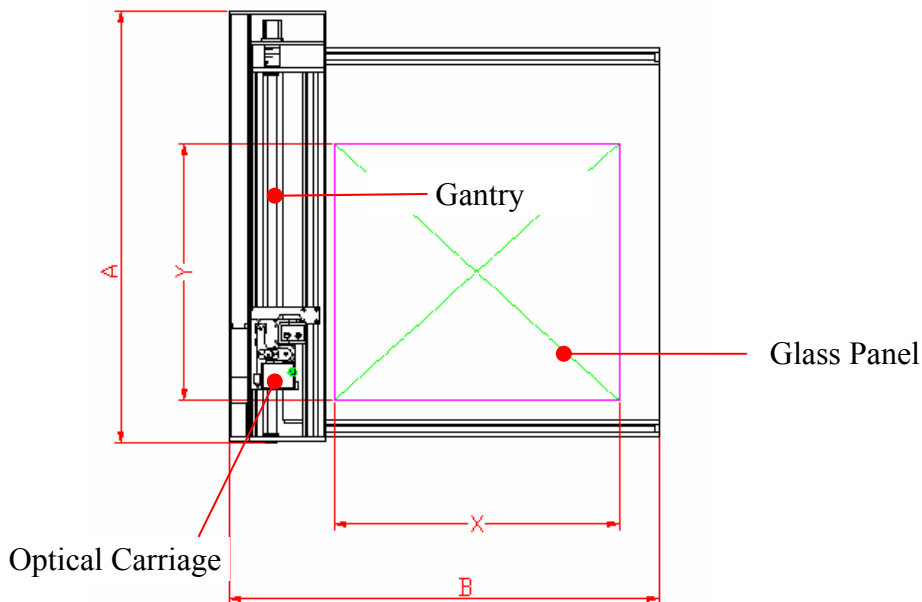
VCA system has been designed to provide precise, easy contact angle analysis for the vast majority of applications. However, there may be specific applications with custom requirements. In most cases we can design a solution and retrofit the existing platform to accommodate your specific demands. If you have any questions, comments, or suggestions, please call **AST Products, Inc.** at +1-978- 667-4500.

Revised March 9, 2004

Available Models of VCA-4600 Series

VCA-4600 Series is primary catered to the needs of TFT-LCD industry, though other FPDs make uses of them as well. The designation of model numbers follows the sizes of gantry definition of generations that are popular with the TFT-LCD manufacturers.

Level	R&D	G2	G3	G4	G5	G6
E	4610E	4620E				
M		4620M	4630M 4633M 4635M	4640M		
ML				4640ML	4650ML 4655ML	
S		4620S	4630S 4633S 4635S	4640S		
SL					4650SL 4655SL	
DL					4650DL 4655DL	4660DL
XL						4660XL



Important Dimensions		(All units in mm)							
Model Number	4610	4620	4630	4633	4635	4640	4650	4655	4660
A: Overall width	598	698	1093			1330	1800		2100
B: Overall length	766	866	916	1086	1196	1439	1619	1819	2319
Y: Carriage range	300	400	650			730	1200		1500
X: Gantry range	400	500	550	720	830	920	1100	1300	1800

VCA 4600 Series

Visual Contact Angle Flat Panel Display Surface Cleanliness Inspector

6

VCA system has been designed to provide precise, easy contact angle analysis for the vast majority of applications. However, there may be specific applications with custom requirements. In most cases we can design a solution and retrofit the existing platform to accommodate your specific demands. If you have any questions, comments, or suggestions, please call **AST Products, Inc.** at +1-978- 667-4500.

Revised March 9, 2004

Common Specifications

Model	4610	4620	4630	4640	4650	4660
Camera and Lens						
Camera	1/3" high-resolution CCD					
Lens	55 mm F2.8 + 2X Extension					
Aperture	User Adjustable					
Resolutions	750 x 480 pixels					
Syringe						
Syringe Capacity	100 (standard) or 500 (optional) micro-liters					
Stepping Motor	1.8 degree Stepping					
Dipping Distance	10 mm					
Minimum Drop Volume	0.1% of full syringe capacity					
Drop Placement	+/- 0.1 mm					
Needle Gauge	Stainless Steel, 28 gauge					
Back Light Module						
Lamp Life	10,000 hours min					
Optical Carriage						
Vertical Traveling Distance (mm)	20 mm					
X Motion Resolution (mm)	0.1					
Y Motion Resolution (mm)	0.1					
Moving Speed (cm/sec)	5 max.					
Measurement						
Minimum pitch of measurements	50 mm in Y direction and 5 mm in X direction					
Measurement Dead Zone	20 mm from the edges of sample					
Measurement Accuracy	+/- 1°					
Programmable Points	5700 max.					
Measurement Speed	4 seconds dispense and calculation per point					
PC Workstation						
CPU	2.8 GHz Pentium IV					
RAM	512 MByte					
Hard Disk Capacity	80 GByte					
Monitor	17" VGA CRT	15" TFT LCD with swing arm				
Network Card	100Mbps					
Optical Storage	CD-ROM (Standard), CD-R (Optional)					
Mouse, Keyboard	Yes					
Operating System	Windows XP Home (Standard); Windows 2000 Pro(Optional)					

* The specifications of VCA-4600 Series may be changed without prior notice.

VCA 4600 Series

Visual Contact Angle Flat Panel Display Surface Cleanliness Inspector

VCA system has been designed to provide precise, easy contact angle analysis for the vast majority of applications. However, there may be specific applications with custom requirements. In most cases we can design a solution and retrofit the existing platform to accommodate your specific demands. If you have any questions, comments, or suggestions, please call **AST Products, Inc.** at +1-978- 667-4500.

Revised March 9, 2004

Automation Level Specifications

Level	E	M	S	D	X
Motion Axes					
X (Gantry) Motion	<i>H</i>	<i>H</i>	<i>C</i>	<i>C</i>	<i>C</i>
Y (Carriage) Motion	<i>H</i>	<i>M</i>	<i>C</i>	<i>C</i>	<i>C</i>
Z (Carriage Vertical) Motion	<i>H</i>	<i>H</i>	<i>H</i>	<i>C</i>	<i>C</i>
Syringe Dipping Motion	<i>H</i>	<i>M</i>	<i>M</i>	<i>C</i>	<i>C</i>
Operating Modes					
Manual Mode	×	●	●	●	●
Teaching Mode	×	×	●	●	●
Auto Mode	×	×	●	●	●
Auto Syringe Refilling	×	×	×	●	●
Safety Features					
EMO	0	0	1	1	2
Software					
Contact Angle Calculations	●	●	●	●	●
AutoFAST	●	●	●	●	●
SPC Statistical Analysis	●	●	●	●	●
SE-2500 Surface Energy Calculations	●	●	●	●	●
Time-based Contact Angle Analysis	●	●	●	●	●
Data View	●	●	●	●	●
2D Charting	●	●	●	●	●
Programmable Recipes	×	×	×	●	●
Programmable Measurement Points	×	×	●	●	●
3D Charting	×	×	●	●	●
Data File Upload (Remote Copy)	×	×	×	●	○
Work Scheduler	×	×	×	○	●
Remote Recipe Download	×	×	×	○	●
Networking					
Network Access	●	●	●	●	●
Auto Data File Remote Copy/Backup	×	×	●	●	●
Web-based Data Server	×	×	×	×	●

* ASTP reserves the right to change specifications of VCA-4600 without prior notice.

H: Hand-operated; *M*: manual key-actuated; *C*: Computer-controlled

●: Standard feature; ○: Optional feature; ×: Not available