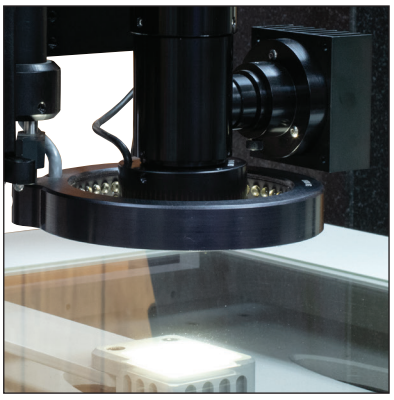
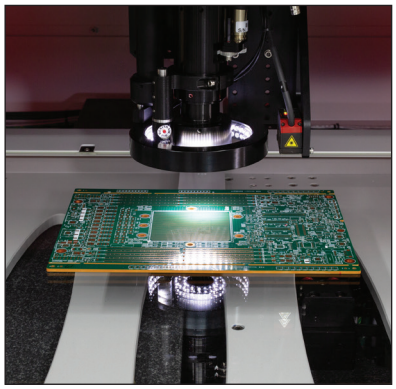
VideoMic® Systems



Multiple Lighting Options Available



PCBA Measurement

VSA713
Video Measurement System
711 mm x 610 mm x 200 mm Range
Shown with Adjustable Quadrant Light

Rapid, Multisensor Video Measurement Machines

Thorlabs' VideoMic® Video Measuring Systems provide high-speed, non-contact 3-axis coordinate measurement with industry-leading accuracy. These multisensor measuring machines can easily verify critical dimensions on first articles, production samples, or entire runs. Automated inspection protocols utilize the system's large field of view and high-resolution sensors to easily inspect large volumes of components sequentially or simultaneously. The system's tolerance reports and export utilities allow for setting thresholds, enabling timely corrections to the production process or, when necessary, interruption of production to minimize scrap. Images are collected on a high-resolution CMOS camera and analyzed with sub-pixel algorithms, enabling sub-micron measurements. Once measured, the feature coordinates and statistics can be stored, analyzed, and exported for additional analysis and reporting.

With a significant worldwide install base and modularity to tackle a wide variety of applications, the VideoMic line of measurement systems has a proven track record of reliability. It is guaranteed to meet the quality assurance requirements of your production facility.

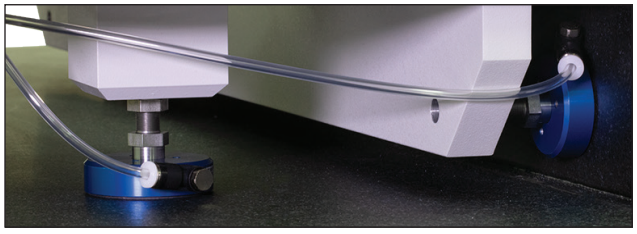
THORLABS

System Options

Six base systems are available, each utilizing a granite, split-axis base and gantry design. VSA base systems utilize balanced linear motors with air bearings to position each axis of travel, while VSM base systems utilize servo-driven ground ball screws to position each axis of travel. Each of the three motor axes and associated encoders is bonded directly to the granite, creating a system that is extremely accurate, stable, and resistant to environmental factors. The powerful M3 metrology software enables all the measurement, dimensioning, and reporting capabilities needed for the qualification of materials.

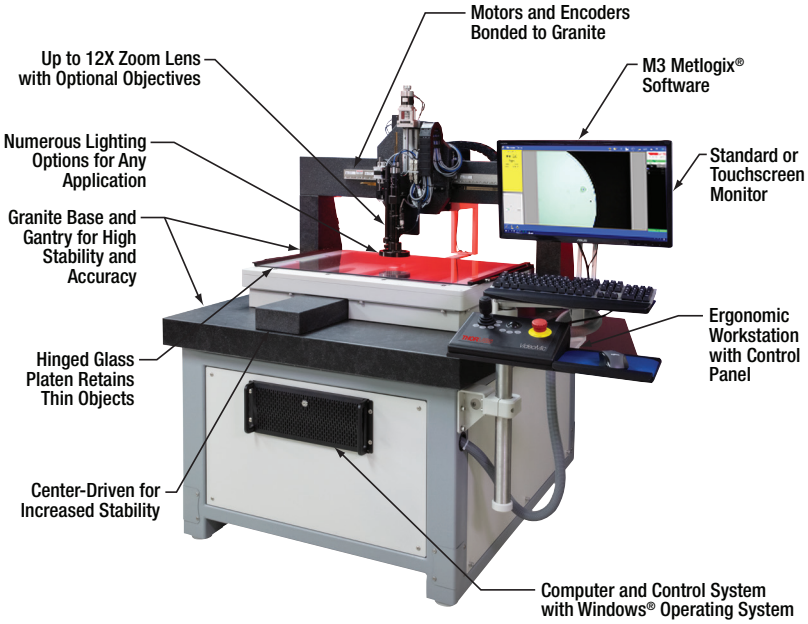
Key Features

- Advanced Metrology Software with a High Degree of Flexibility for Programming
- Enhanced Video Edge Detection (VED) for Selective Feature Measurement
- Simultaneous Measurement of Multiple Features within the Field of View for Quick Program Execution
- 3D Measurement Capabilities in Video, Laser, and Touch Modalities
- Program Creation from Automatic CAD Data Import
- Easy-to-Use Interactive Feature Creation for Manual Program Recording
- Report Generation with Drawing Markups and Customizable Output Table Information
- Data Compatibility with Advanced PCB Analysis Software
- Extremely Flat Granite Bases Provide an Ideal Plane for Stage Motion
- High-Speed Air Bearing Stage Positioning Permits Rapid Feature Detection and Program Execution
- High-Resolution CMOS Cameras for Optimal Image Quality
- Variety of Lighting Options for Enhancing Features for Processing
- Customizable Zoom Lenses Enable Large Field of View or High Resolution
- Auxiliary Sensor Options for Laser and Touch Probes Compliment Video Measurements
- Includes Compact Control Panel and Standard Keyboard to Maximize Operator Performance



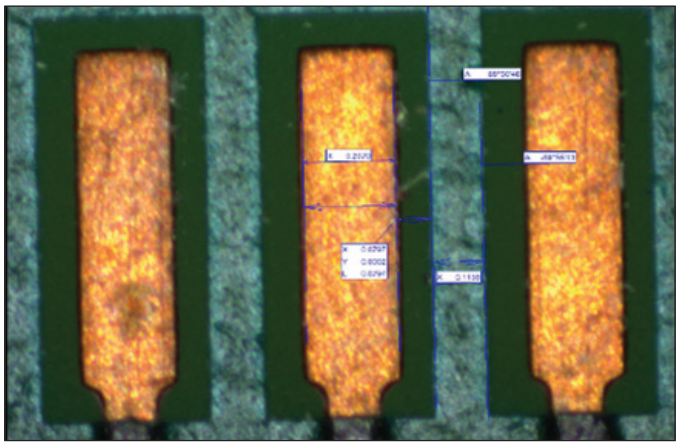
VSA Series systems include frictionless air bearings that do not wear or require lubrication.

VSA Series' Non-Contact Magnetic Track Shown Above the Gold 0.10 µm Encoder



A VSA713 Video Coordinate Measurement System with the Hood Removed

Applications



Our video systems can be customized to meet the specific needs of your application. Below we list several application spaces and examples for which our measurement systems offer industry-leading accuracy when used for inspection.

Electronics

- PCB (Printed Circuit Board) and PCBA (PCB Assembly)
- FPC (Flexible Printed Circuit)
- Connectors (Pin Dimensioning, Pin Alignment)
- Batteries
- Solar Panels

Mechanical Components

- Machined Parts
- Stamped Parts
- Hardware (Screws, Fasteners, Inserts, and Gears)
- Medical Devices

Plastics, Glasses, and Polymers

- Molded Components
- Films

Top: A machined component is positioned for inspection.
Middle: PCBA Inspection Using the On-Axis LED Illuminator and LED Ring Light
Bottom: Trace Measurement of a PCB

Camera Options

Thorlabs offers a 1.3 MP or a 5 MP CMOS color camera for use in our video coordinate measurement (CMM) systems. The 1.3 MP option offers a high-quality onsemi® PYTHON 1300 sensor with a 1/2" optical format and speeds up to 88 fps. It is ideal for quickly imaging a large number of products fixed on the video stage. The 5 MP option offers a high 2456 x 2054 pixel resolution IMX264LQR-C sensor with a 2/3" optical format, making it ideal for detailed inspections of small items. The 5 MP camera will operate at a slower, 22 fps speed and will have an increased FOV, comparatively.

5 MP Camera with 2/3" Optical Format

Specifications

Resolution	**1.3 MP**	**5 MP**
Sensor Type	onsemi®* PYTHON 1300 CMOS Color: NOIP1SE1300A-QDI	Sony®† IMX264 CMOS Color: IMX264LQR-C
Pixels (H x V)	1280 x 1024	2456 x 2054
Imaging Area (H x V)	6.14 mm x 4.92 mm	8.47 mm x 7.09 mm
Pixel Size	4.80 µm x 4.80 µm	3.45 µm x 3.45 µm
Optical Format	1/2"	2/3"
Frame Rate	88 fps	22 fps

* onsemi® is a registered trademark of Semiconductor Components Industries, LLC.
† Sony® is a registered trademark of the Sony Group Corporation.

Accessories

Touch Probe

Thorlabs' video measuring systems are compatible with most Renishaw TP20 and TP200 series 3-axis touch-trigger probes. These are sold as kits that are preconfigured for the video system. Each kit includes a probe body, probe module, stylus, and an optional manual or motorized module-changing rack.

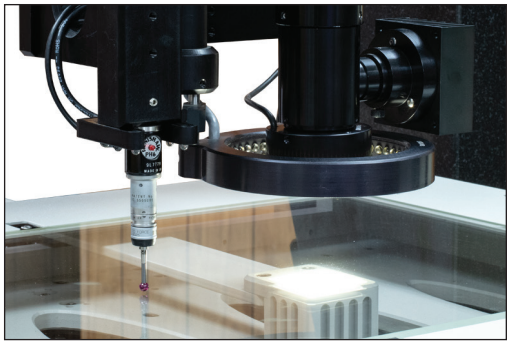
A Selection of LF, SF, and MF Probe Modules and M2 Styli with Varying Tip Styles

Laser Probe

The Triangulation Displacement Laser option determines the target's Z position by measuring the reflected light from the target's surface using an internal CCD detector. The light collection is not colinear; there is a fixed angle between the beam output and the collection optic. This design allows for a significant standoff from the sample. The laser probe is useful for characterizing surface flatness and Z-dimensions of features that allow the angled beam to enter and exit properly.

Confocal Probe

The confocal probe performs a colinear measurement of the Z position, obtained by measuring the spectral response of a white light signal reflected from the sample. The confocal probe enables the highest performance in Z measurements with sub-micron resolution.



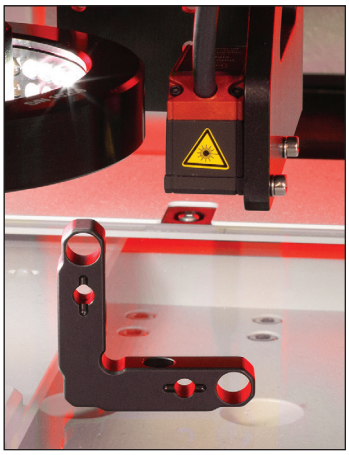
A Mounted TP-20 Touch Probe

Fixturing Options

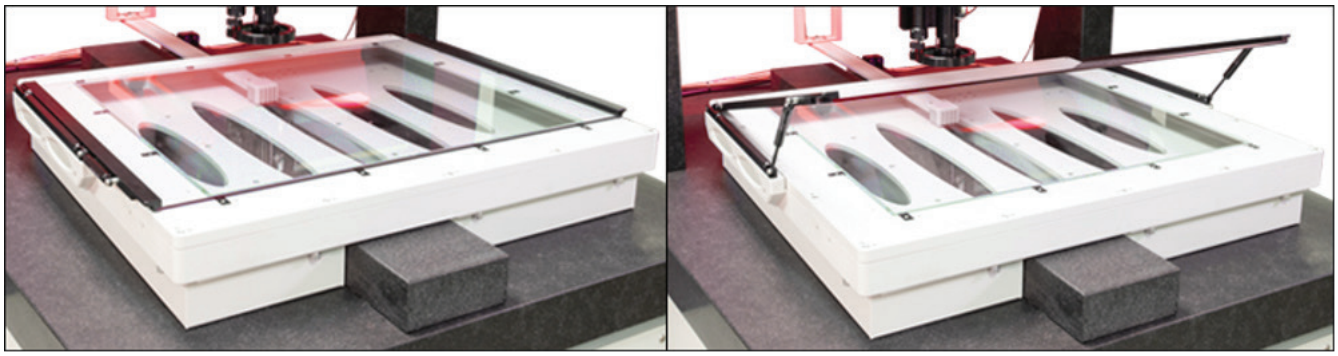
Thorlabs offers numerous options for fixing an object in place during inspection with our video coordinate measuring machines (CMMs). Fixturing is the process of securing an object prior to scanning with a CMM. Doing so allows for repeatable, accurate, and fast measurement scans of a large number of items from a production run. Accommodations for custom mounting hole locations and interconnects can be discussed at the time of purchase.

Hinged Glass Platen

A pneumatic, hinged, glass platen can be added to any stage to secure smaller objects or circuit boards up to 0.20" (5.1 mm) thick. The system is programmed to ensure the detection path column is raised when the platen is opened preventing unwanted collisions.



Laser Probe Being Used to Measure Surface Flatness



The hinged glass platen is shown in its closed (left) and raised (right) positions. The platen can be configured to automatically open as part of a software routine or by manually lifting the glass panel.

Calibration Grid

To confirm the accuracy of a measurement system, a NIST-traceable calibration grid is used. The array of grid targets provides ideal features for measuring the CNC position at the feature sites. The measured feature values can be easily compared to the provided certification, and a resultant report can be generated for quality compliance.

Large-Field-of-View Bi-Telecentric Lenses and High-Magnification Objectives

Depending on the application, the system may require a specialized lens. Large-field-of-view bi-telecentric lenses offer up to an 85.9 mm field of view and a 30 mm depth of field. Bi-telecentric lenses increase measurement speed by allowing more features to be captured within a single image, in addition to requiring fewer Z-axis adjustments due to the significant increase in depth of field. To obtain the highest levels of feature detail, a variety of machine vision objective lenses are also available.

TL1X-SAP
1X Super Apochromatic Microscope Objective

MVBT2313
0.128X Bi-Telecentric Lens

Objectives

Item #[a]	Wavelength Range	M[b]	WD
TL1X-SAP	420 - 700 nm	1X	8.0 mm
MY5X-802B	436 - 656 nm	5X	36.5 mm
MY10X-803		10X	34.0 mm
MY20X-804		20X	20.0 mm
MY50X-805		50X	13.0 mm

a. Compatible 12X and 6.5X zoom lens systems are also available, with 0.25X, 0.5X, and 0.75X auxiliary lenses.
b. When Used with a 200 mm Focal Length Tube Lens

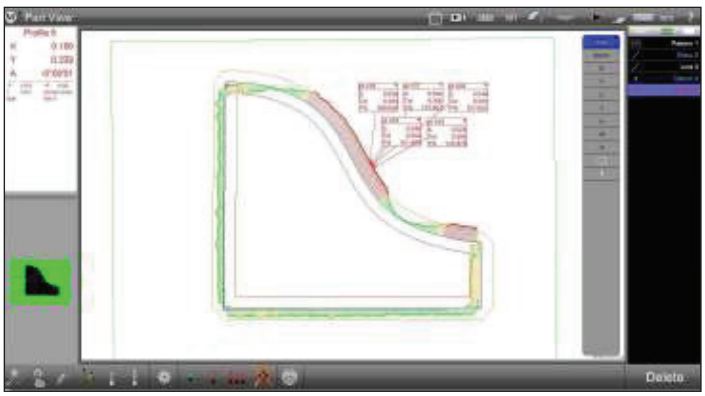
Bi-Telecentric Lenses

Item #	M	WD[a]	Depth of Field[b]
MVBT2313	0.128X	179.0 mm	±15 mm
MVBT2324	0.243X	97.9 mm	±11 mm

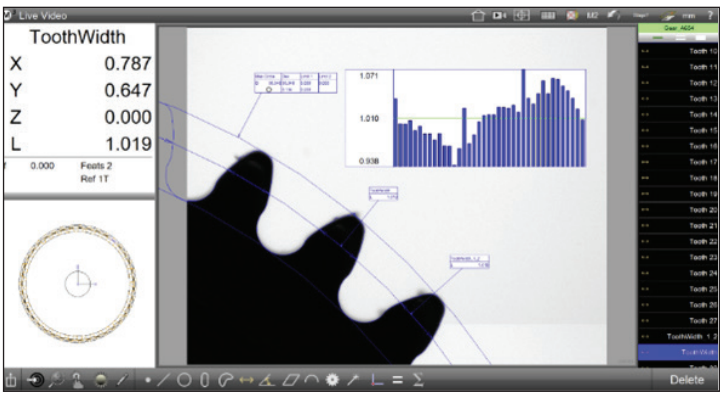
a. Working distance is specified from the center of the depth of field to the first mechanical surface of the lens housing.
b. Specified at 70 lp/mm and 50% MTF.

Software Options

Additional M3 software features can be purchased and enabled for thread measurements, gear measurements, profiling geometries, and digital comparator capabilities. Upgrades to the included LCD monitor and software are offered, as are import and export software utilities, and statistical process control (SPC) software packages.



M3 Profiling Add-On



M3 Gear Inspection Add-On

Specifications

VideoMic® Video Measurement System Specifications

Base System Item #[a]		VSM463	VSM713
XYZ Control			
Stage Bearings		Mechanical	
Stage Motors		Servo	
Measurement (Travel) Range	X-Y	460 mm x 305 mm (18" x 12")	711 mm x 610 mm (28" x 24")
	Z	200 mm (8")	
Accuracy[b]	X-Y (E2)	(2.5 + 5L/1000) µm	
	Z (E1)	(1.5 + 5L/1000) µm	
Velocity	X-Y	≤760 mm/s	
	Z	150 mm/s	
Repeatability	Z	±3 µm (±0.00012") at High Magnification	
Granite	Flatness	≤5 µm (Over Any 700 mm Area)	
	Roughness	Ra0.4 (Equivalent to RMS16)	
	Waviness	≤1 µm / 100 mm x 100 mm	
Unit Dimensions			
Footprint	Width	40" (102 cm)	50" (127 cm)
	Depth	40" (102 cm)	67" (170 cm)
Total Height		68" (173 cm)	
Approximate System Weight (Crated / Uncrated)		2300 lbs (1000 kg) / 1600 lbs (700 kg)	3600 lbs (1600 kg) / 2700 lbs (1200 kg)
Approximate Footprint Overhang[c]	Control	Up to 25" (64 cm)	
	Station		
Top Clearance		Allow for Approximately 48" (122 cm) for Servicing	
Rear Clearance		Allow for Approximately 24" (61 cm) for Servicing	
General			
Operating Temperature	Range	20 ± 0.5 °C (67 to 69 °F)	
	Rate	0.25 °C/hr (0.5 °F/hr)	
Relative Humidity (Non-Condensing)		30% - 80%	
Line Voltage		115 / 230 VAC, 50 / 60 Hz, Single Phase, 1.0 kW	

a. The base item number indicates the unit size, measurement range, and bearing/motor type of the chosen system. The magnification optics, camera, and lighting options can then be customized to suit a specific application. Contact TMS-Sales@thorlabs.com for help in selecting system options and specifications.
b. L is the point-to-point travel distance, or diagonal travel distance. This applies to a thermally stable system at 20 °C using a certified artifact, pixel value of 2 µm or less, evenly distributed load, and a standard measuring plane.
c. The control station includes the monitor, keyboard, mouse, and control pad; it is mounted at the front of the unit.

VideoMic® Video Measurement System Specifications

Base System Item #[a]		VSA463	VSA713	VSA963	VSA1273
XYZ Control					
Stage Bearings		Air			
Stage Motors		Linear			
Measurement (Travel) Range	X-Y	460 mm x 305 mm (18" x 12")	711 mm x 610 mm (28" x 24")	965 mm x 760 mm (38" x 30")	1270 mm x 915 mm (50" x 36")
	Z	200 mm (8")			
Accuracy[b]	X-Y (E2)	(1.5 + 5L/1000) µm			
	Z (E1)	(1.5 + 5L/1000) µm			
Velocity	X-Y	≤760 mm/s			
	Z	150 mm/s			
Repeatability	Z	±3 µm (±0.00012") at High Magnification			
Granite	Flatness	≤5 µm (Over Any 700 mm Area)			
	Roughness	Ra0.4 (Equivalent to RMS16)			
	Waviness	≤1 µm / 100 mm x 100 mm			
Unit Dimensions					
Footprint	Width	40" (102 cm)	50" (127 cm)	60" (152 cm)	85" (216 cm)
	Depth	40" (102 cm)	62" (157 cm)	75" (191 cm)	92" (234 cm)
Total Height		68" (173 cm)		73" (185 cm)	76" (193 cm)
Approximate System Weight (Crated / Uncrated)		2300 lbs (1000 kg) / 1600 lbs (700 kg)	3600 lbs (1600 kg) / 2700 lbs (1200 kg)	4500 lbs (2000 kg) / 3500 lbs (1600 kg)	6600 lbs (3000 kg) / 5400 lbs (2400 kg)
Approximate Footprint Overhang[c]	Control Station	Up to 25" (64 cm)			
Top Clearance		Allow for Approximately 48" (122 cm) for Servicing			
Rear Clearance		Allow for Approximately 24" (61 cm) for Servicing			
General					
Operating Temperature	Range	20 ± 0.5 °C (67 to 69 °F)			
	Rate	0.25 °C/hr (0.5 °F/hr)			
Relative Humidity (Non-Condensing)		30% - 80%			
Line Voltage		115 / 230 VAC, 50 / 60 Hz, Single Phase, 1.0 kW			
Air Supply	Velocity	85 L/m (3 CFM) Dry Air			
	Pressure	7 - 8.25 Bar (100 - 120 PSI)			

a. The base item number indicates the unit size, measurement range, and bearing/motor type of the chosen system. The magnification optics, camera, and lighting options can then be customized to suit a specific application. Contact TMS-Sales@thorlabs.com for help in selecting system options and specifications.
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c. The control station includes the monitor, keyboard, mouse, and control pad; it is mounted at the front of the unit.

Worldwide Support

Thorlabs, Inc.
Newton, New Jersey
Phone: 1-973-300-3000
Email: sales@thorlabs.com

Thorlabs Vytran® Division
Morganville, New Jersey
Phone: 1-973-300-3000
Email: sales@thorlabs.com

Thorlabs Measurement Systems (TMS) - NJ
Sparta, New Jersey
Phone: 1-908-362-6200
Email: tms-sales@thorlabs.com

Thorlabs Measurement Systems (TMS) - NH
Londonderry, New Hampshire
Phone: 1-973-300-3000
Email: tms-sales@thorlabs.com

Thorlabs Lens Systems
Rochester, New York
Phone: 1-973-300-3000
Email: techsales@thorlabs.com

Thorlabs Quantum Electronics (TQE)
Jessup, Maryland
Phone: 1-973-300-3000
Email: sales-TQE@thorlabs.com

Thorlabs Laser Systems and Technology (LST)
Jessup, Maryland
Phone: 1-973-300-3000
Email: sales@thorlabs.com

Thorlabs Imaging Systems
Sterling, Virginia
Phone: 1-703-651-1700
Email: imagingsales@thorlabs.com

Thorlabs Spectral Works (TSW)
West Columbia, South Carolina
Phone: 1-973-300-3000
Email: sales@thorlabs.com

Thorlabs Ultrafast Optoelectronics
Ann Arbor, Michigan
Phone: 1-973-300-3000
Email: sales@thorlabs.com

Thorlabs Colorado Center for Innovation (CCI)
Lafayette, Colorado
Phone: 1-973-300-3000
Email: sales@thorlabs.com

Thorlabs Praevium Research Division
Goleta, California

Thorlabs Canada
Phone: 1-973-300-3000
Email: sales@thorlabs.com

Thorlabs Ltda, Brazil
Phone: +55 (21) 2018 6490
Email: brasil@thorlabs.com

Thorlabs Ltd.
Phone: +44 (0)1353 654440
Email: sales.uk@thorlabs.com

Thorlabs SAS France
Phone: +33 (0) 970 444 844
Email: sales.fr@thorlabs.com

Thorlabs GmbH / Thorlabs Lübeck
Phone: +49 (0) 8131 5956-0
Email: europe@thorlabs.com

Thorlabs Elliptec® GmbH
Phone: +44 (0)1353 654440
Email: sales.uk@thorlabs.com

Thorlabs Vytran® Europe
Phone: +44 (0) 1392-445777
Email: vytran.uk@thorlabs.com

Thorlabs Sweden AB
Phone: +46 31 733 3000
Email: scandinavia@thorlabs.com

Thorlabs China Ltd.
Phone: +86 (0)21-60561122
Email: chinasales@thorlabs.com

Thorlabs Japan
Phone: +81-3-6915-7701
Email: sales@thorlabs.jp

To speak with an OEM Specialist, email OEMSales@thorlabs.com