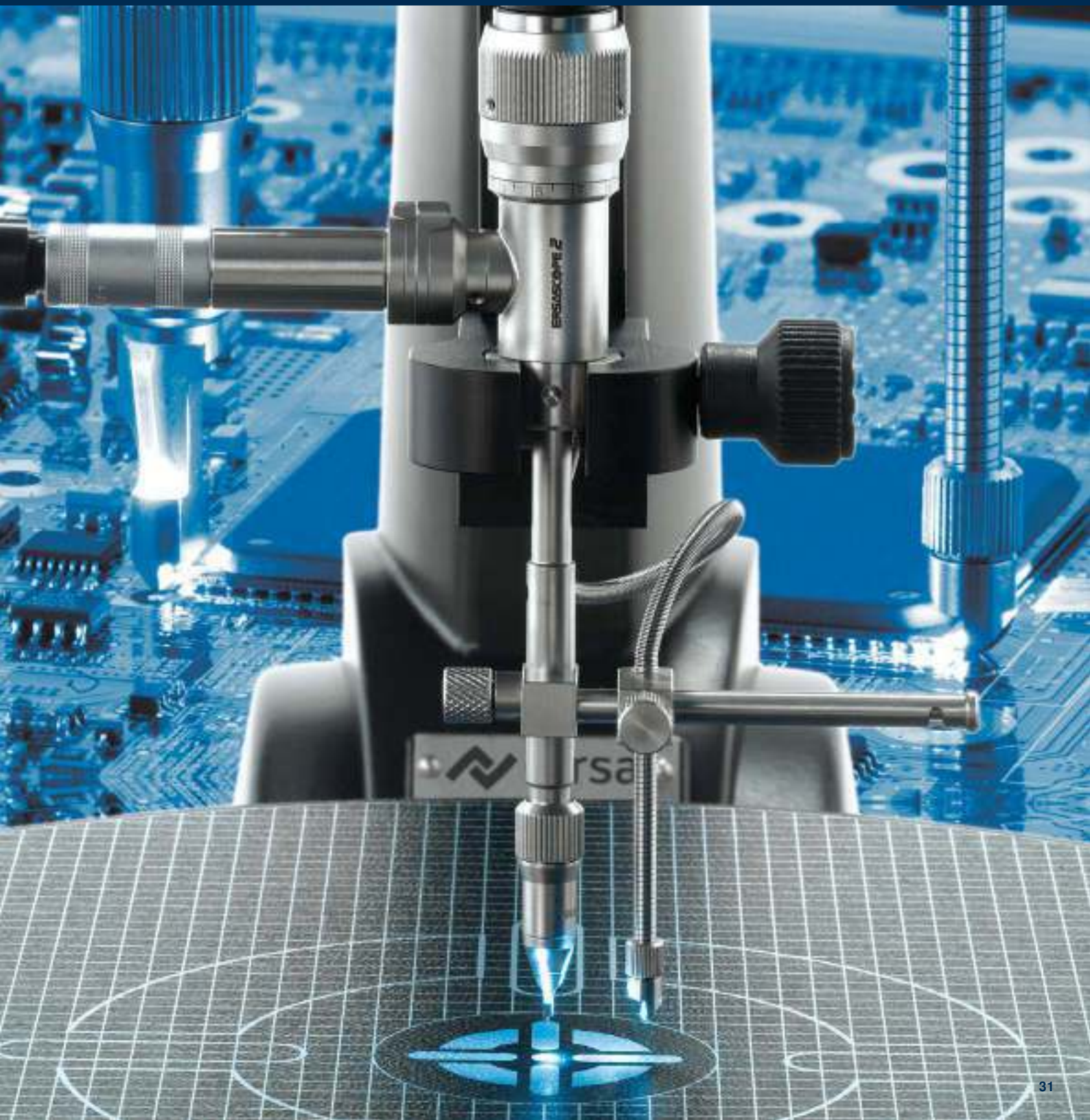
Inspection



Proper Inspection Can Save Money!

Industry standards like IPC & experts alike promote hidden solder joint inspection

Industry experts rely on endoscopic inspection technology. The IPC standard IPC-7095B (March 2008) recommends the use of endoscopes for BGA inspection.

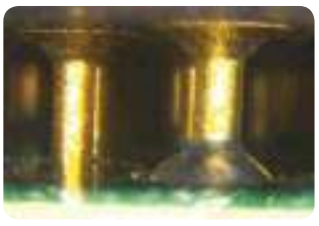
The introduction of the lead-free processes lead to new problems and required an improved inspection process, as it is offered by the ERSASCOPE technology. The defects shown in the images below cannot be detected with standard microscopes. If undetected, such problems will result in the improper qualification of the lead-free process.

The award-winning ERSASCOPE is a patented, endoscope-based system specifically designed for hidden solder joint inspection under components like BGAs, CSPs and Flip-Chips.

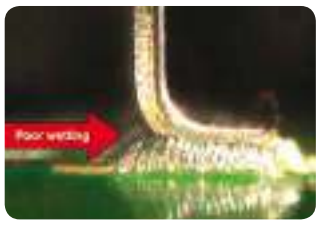
To See is to Survive – Only by being capable of seeing all potential problems in your process will you be able to react, in order to correct those problems, to assure quality and TO SAVE MONEY!

Flux residue under BGA

Top-side delamination of BGA



PGA: insufficient hole fill



PQFP: missing interior heel fillet

ERSASCOPE

Best in class inspection technology

US patent no. US 6,580501
EU patent no. EP 1123 525

1999 Dr. Rudolf-Eberle,
Innovation Prize, Germany

1999 Most Innovative Product,
ELENEX Australia

2000 Best Product in Show,
Component & Electronic, Sweden

2000 EP&P Excellence Award,
Nepcon, USA

2000 EP&P Grand Award,
Nepcon, USA

2000 SMT Vision Award,
Best New Product, Inspection, Apex, USA

ERSASCOPE 1 vs. ERSASCOPE 2

Which system is best for which inspection application?

Best in class optical inspection technology for inspecting underneath components

The award winning and patented original ERSASCOPE technology has been further developed in order to meet today's lead-free and low component profile challenges.

The ERSASCOPE 1 offers a cost-effective optical inspection solution in accordance with the new IPC Inspection Standards (see IPC-7095B) for not only BGA, but also for the hidden, interior joints on SMD and TH components.

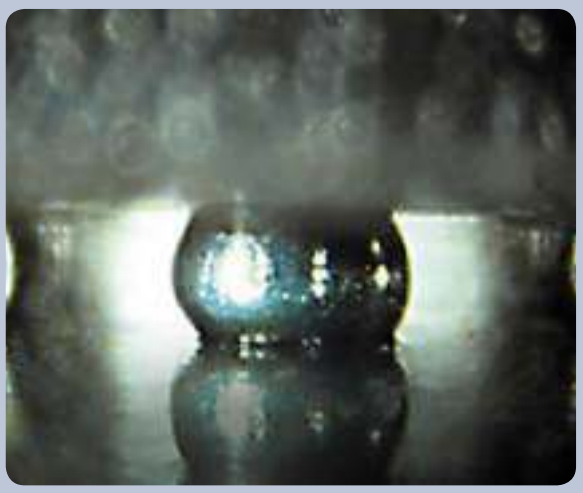
The ERSASCOPE 2 is currently the ONLY inspection system in the world offering exchangeable optical heads for Flip-Chip, CSP, BGA and 0201 optical inspection.

ERSASCOPE 1: fixed optics for BGAs

ERSASCOPE 2: exchangeable optics for CSPs

The ERSASCOPE XL system with retraction unit and XL-table for the inspection of oversized assemblies.

ERSASCOPE 1 image of BGA (gap ~ 300 µm)



ERSASCOPE 2 image of Flip-Chip (gap ~ 30 µm)

Whereby both ERSASCOPE systems are fundamentally similar in their capabilities, they differ technically in the following functional areas listed in the technical comparison table below.

When considering inspection applications, the two ERSASCOPE systems differ with respect to the standoff height of the component to be inspected and the density of the PCB. The 90° lens of the ERSASCOPE 1, for example, has a footprint of 1.5 x 4.5 mm, a magnification of up to 400x* and a typical inspection gap of ~ 300 µm. The Flip-Chip optical lens of the ERSASCOPE 2, on the other hand, has a footprint of only 0.6 x 4.0 mm, a magnification of up to 700x* and a typical inspection gap of ~ 30 µm.

Low standoff components such as CSPs and Flip-Chips are thus better inspected with the ERSASCOPE 2 system.

* 20" monitor, 1600 x 1200 pixel resolution, no digital zoom

Technical comparison:

Part	ERSASCOPE 1	ERSASCOPE 2
Optical head	Endoscope with fixed integrated lens	Endoscope with exchangeable lenses
Camera	Digital USB camera	High-resolution CCD, 1.3 megapixel
Light source	Halogen	Metal halide
Table	x/y	x/y rotation
Software	ImageDoc	ImageDoc

ERSASCOPE 2

The world's only optical inspection system for Flip-Chips and CSPs

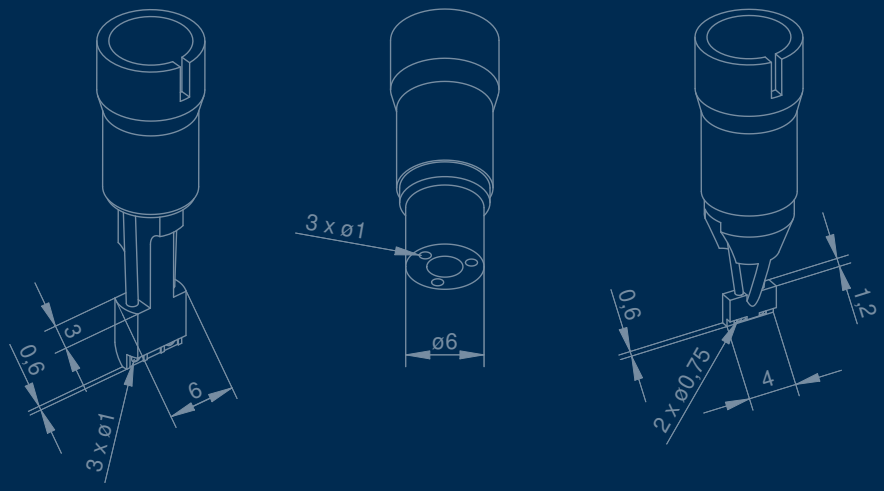
Easy to change and robust optical heads offer the greatest inspection flexibility

The ERSASCOPE 2 comes standard with an LED light source. The LED light offers a much cleaner and brighter white light compared to other systems. The light quantity is regulated electronically without changing temperature or color of the light during dimming. Two mechanical irises on the optic carrier allow for an individual and separate continuously variable dimming (0 to 100 %) of the front- and backlights. Also standard is a newly designed fiber optic light brush made up of individual fibers (0.050 mm diameter) which can be inserted under most area array packages for optimal illumination during inspection.

Optical carrier

The ERSASCOPE 2 optical carrier is a highly advanced, endoscope-based system offering a rapid exchange of the 3 robust optical heads (lenses) as well as precise image focussing and superior light management. Value added features include:

- Fiber optic front and backlights with mechanical iris, adjustable from 0 to 100 %
- Swing-out and fixture mechanism of backlight arm
- Connection and fastening of the 3 optical heads
- Focus ring with measurement scale
- "One Click" interface for fiber optic light cable








90° Flip-Chip head | *90° SMD & BGA head* | *0° microscope head*

Flip-Chip 90° optical head

The revolutionary Flip-Chip optical head has the smallest footprint in the industry (0.6 x 4.0 mm) and has been specifically designed for use on densely packed PCBs. The ERSASCOPE 2 Flip-Chip head's aperture height is so low that it is now possible with a magnification of up to 700x to inspect even a typical gap of ~ 30 µm. The critical top-side Flip-Chip joint, never before seen by any BGA optical inspection equipment on the market, is now visible!

BGA 90° optical head

The ERSASCOPE 2 BGA optical head provides a high-resolution, 90° viewing angle under the component. This light sensitive optical lens offers a 425x magnification in a typical inspection gap of ~ 300 µm and a footprint of 3 x 6 mm. The digital zoom makes it possible to inspect the interior joints underneath the BGA component!

"Look down", 0° optical head

The wide angle, 0° optical head offers viewing similar to a microscope. The integrated fiber optic lighting perfectly illuminates and magnifies up to 250x for high-contrast surface and via hole inspection.

Features of the ERSASCOPE 2

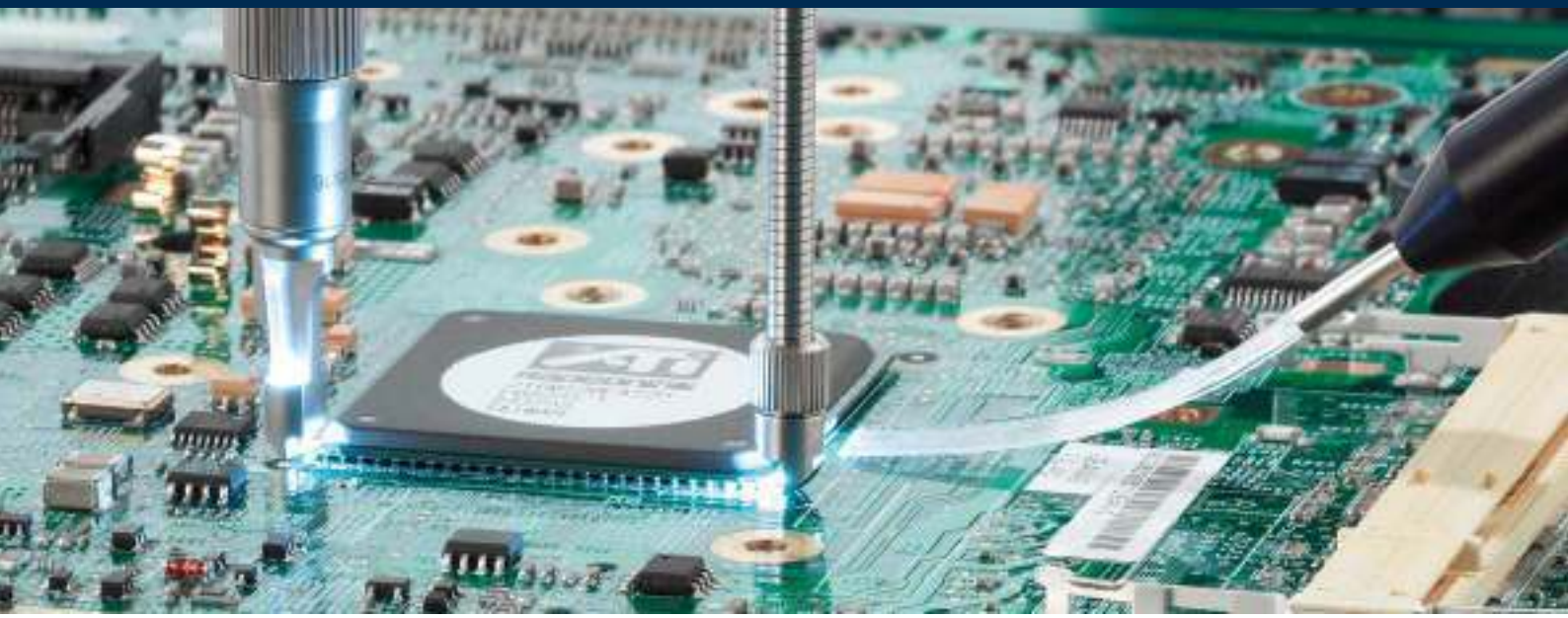
- High-resolution USB 2.0-CCD camera
- Flip-Chip optical head (700x magnification, gap ~ 30 µm)
- BGA optical head (425x magnification, gap ~ 300 µm)
- Wide angle 0° "look down" optical head (250x)
- Optional high-quality MACROZOOM head (70x) with fiber ring light
- Long-life LED light source
- Light management: fiber optic front and backlights with mechanical iris, fiber optic light brush and -flat light brush, gooseneck
- Stand and table with a total of 7 axes of movement for the optical heads and the board
- ImageDoc Basic or ImageDoc EXP software for both beginners and advanced operators
- Large problem/solution database
- Advanced recording, measurement and reporting functions
- "Plug & Play" setup

Ordering information:

Order number	Description
0VSSC600	**ERSASCOPE 2 inspection system,** complete
0VSSE200-90K	**90° optical head**
0VSSE200-FCK	**Flip-Chip optical head**
0VSSE200-0K	**0° optical head**

Light, Camera and Action!

Best in class inspection productivity with highest quality images



Optimal component illumination is essential for a quality inspection process

Superior light management

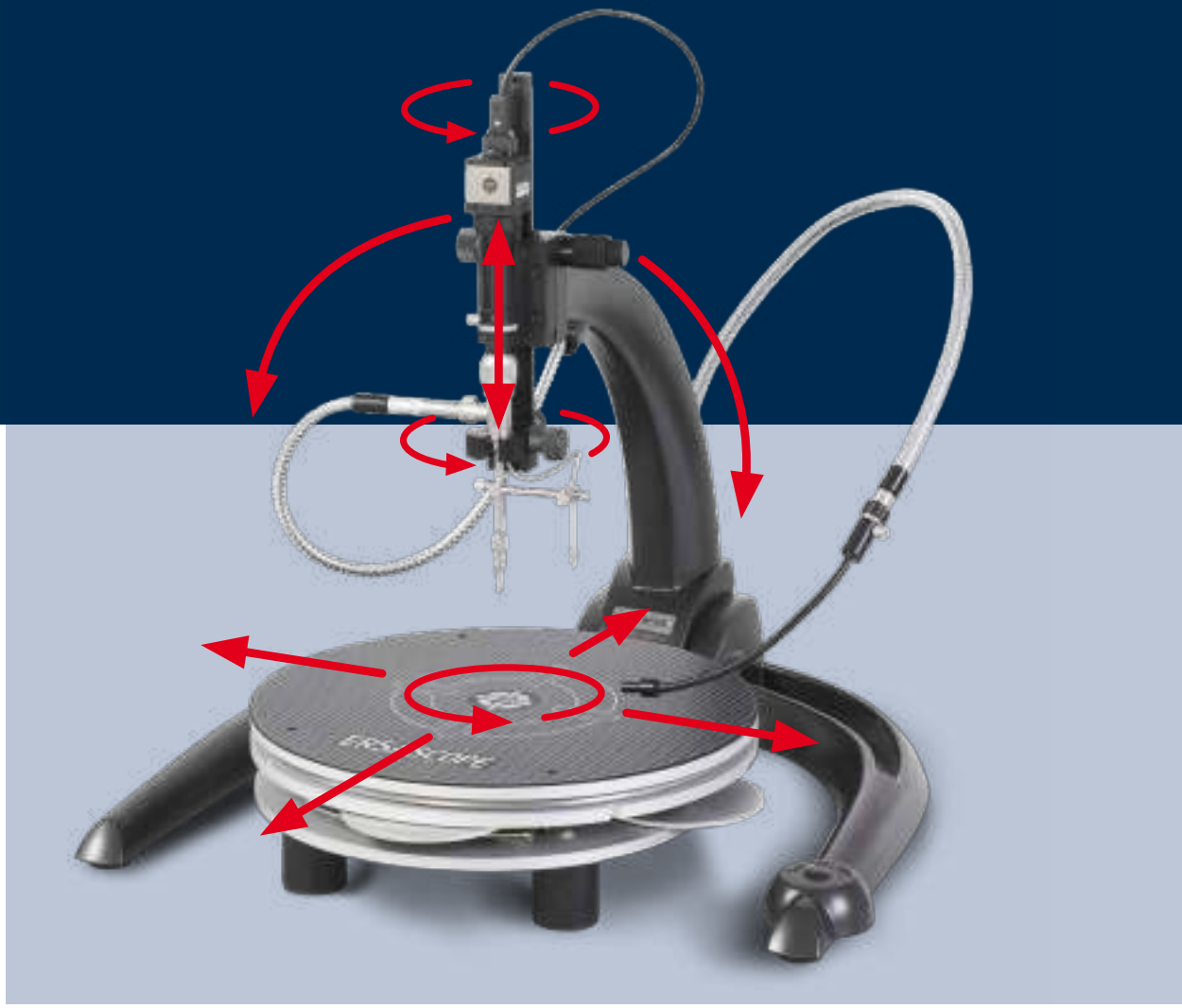
The LED light source of the ERSASCOPE 2 inspection system offers clean and bright white light.

The light quantity is regulated electronically without changing temperature or color of the light during dimming.

Furthermore, all fiber optic light cables have a mechanical iris. Two mechanical irises on the optic carrier allow for an individual and separate continuously variable dimming adjustment from 0 % to 100 % of the front and backlights.

Also standard is a newly designed fiber optic light brush. This new light brush is made up of individual fibers (0.050 mm diameter) which can be inserted under most area array packages and mechanically dimmed for optimal lighting during inspection.

Mechanical irises control both the front & backlights for perfect lighting



7 axes of movement of the ERSASCOPE optic positioning guarantees maximum flexibility and productivity

High-resolution, light sensitive USB 2.0 camera

In addition to optimal light management, image quality depends not only on precision optics, but also on high-quality camera technology. The high-resolution and highly light sensitive Ersa USB 2.0 camera has 1.3 megapixels and delivers images of highest detail and perfect contrast. Even the smallest object details can be captured, digitally enhanced and used for quality assurance and documentation purposes.

ERSASCOPE inspection stand and table

The ERSASCOPE stand and inspection table offer the most accurate BGA inspection in the fastest cycle time when compared to all competitive systems on the market. The greatest flexibility with a total of 7 axes of movement of the ERSASCOPE optic positioning is guaranteed: optics pan positions every 90°, unlimited table rotation, unlimited camera rotation, free tilting of optics between +/- 90° with zero degree lock position, x/y/z adjustment in micrometer range.

Removable fibre optic light brush incl. mechanical iris

ERSASCOPE 1
The award-winning and patented original

Optics

The patented ERSASCOPE is the world's first optical inspection system which allows for non-destructive manual inspection of BGAs.

Today over 3,000 users worldwide are benefiting from finding defects that otherwise would have gone undetected by other inspection methods.

The ERSASCOPE 1 optics is a specially designed endoscope with an integrated fiber optic system, focus ring and adjustable backlight; a footprint of 1.5 x 4.5 mm; a magnification of up to 400x and a typical inspection gap of ~ 300 µm.

Camera

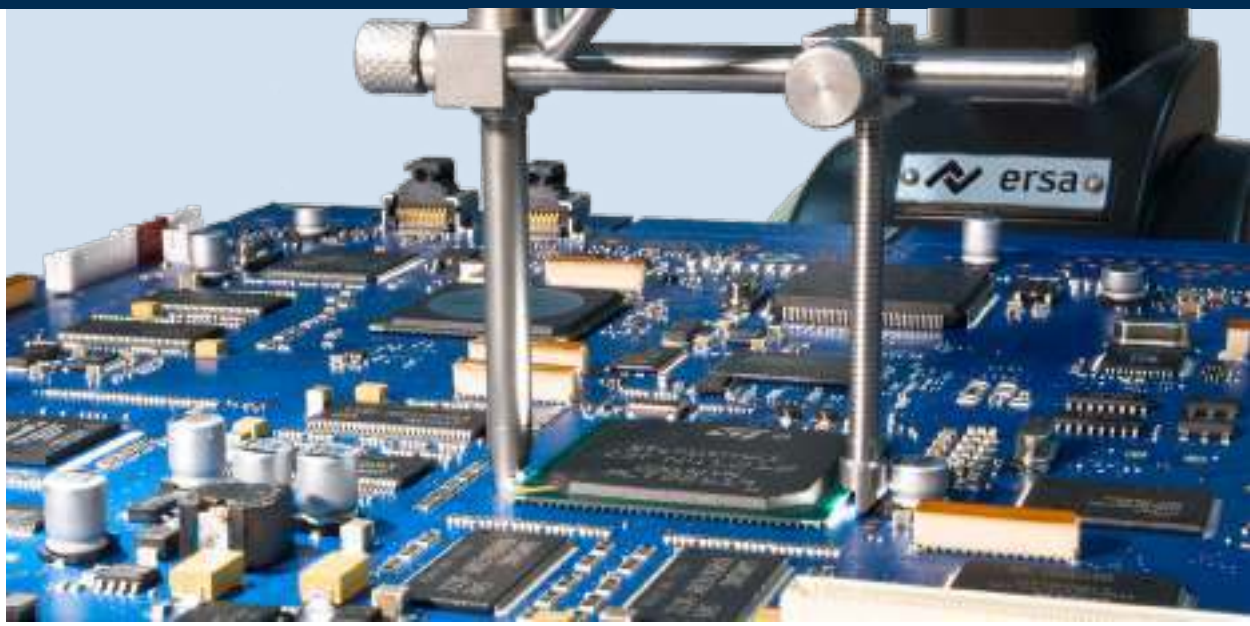
The digital camera with USB 2.0 interface uses CMOS technology offering optimal light sensitivity and resolution. The halogen light source supplies optimal light to both the ERSASCOPE 1 optics as well as the flexible gooseneck which is included in the delivery.

Light management

Two light outlets at the optical carrier system and a flexible gooseneck ensure superb light distribution both on the PCB surface and beneath the component.

Via mechanical coupling of the backlight with the inspection head, the illumination remains uniform during movement along the component thus

High magnification and viewing angles from 0 to 90° offer maximum inspection flexibility



Integrated front and back lighting allows for optimal illumination of the hidden joints underneath the component

allowing for the fastest BGA inspection of any system on the market.

The Ersa halogen, "cold" light source was specifically designed for ERSASCOPE industrial endoscopy and image processing. Continuous dimming from 0 to 100 % ensures an optimal light control in areas where an exact lighting adjustment is required such as by hidden joint inspection underneath BGAs.

Table and stands

The multifunctional ERSASCOPE inspection stand includes a z-axis course and fine adjustment of the optics and offers a total of 6 axes of movement for the optics. It is thus possible to view an object at almost any angle! The x/y PCB table has two control wheels for quick and fine positioning of the PCB during inspection.

Software

Image processing and documentation software goes hand in hand with today's inspection requirements. The ERSASCOPE 1 comes standard with ImageDoc Basic inspection software.

Features of the ERSASCOPE 1

- High-resolution USB 2.0 CMOS camera
- High-quality BGA optical head (400x magnification, gap ~ 300 µm)
- High-quality MACROZOOM head (70x) with fiber optic ring light (option)
- Long-life halogen light source
- Light management with gooseneck and optional fiber optic light brush or flat light brush
- Stand and table with a total of 6 axes of movement for the optical heads and PCB
- ImageDoc Basic or ImageDocEXP software for both beginners and advanced operators
- Large problem/solution database
- Recording, measurement and reporting functions
- "Plug & Play" setup

Ordering information

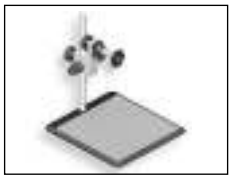
Order number	Description
0VSSC070	**ERSASCOPE 1 inspection system,** complete

Ersa MOBILE SCOPE

Mobile optical inspection system for electronics production

X-Y table

Foot switch for image capture



Stand unit 0VSST060

Stand unit for LED light brush

Desktop holder for Ersa MOBILE SCOPE

Stand unit 0VSST065 with Ersa MOBILE SCOPE

The Ersa MOBILE SCOPE is a compact and handy, portable video microscope to inspect solder joints in electronic production environments. It has been designed for optical inspection and digital image recording including measurements of solder joints on Ball Grid Array (BGA), µBGA, CSP and Flip-Chip packages.

Furthermore, the Ersa MOBILE SCOPE can also be used to visually inspect lands, solder paste prints or, in general, to visually inspect components in Surface Mount Technology (SMT) or in Trough-Hole Technology (THT) on the board. The device can be used in quality control, production, laboratories or R&D departments.

The compact Ersa MOBILE SCOPE connects with a PC or any portable computer via a USB interface and is ready for operation within minutes in any location.

By means of the high-quality BGA optical head, components with hidden solder joints can easily be inspected, a MACROZOOM lens allows top-view surface inspection in various magnifications. Both optical heads are plugged onto the high-resolution digital color camera hand piece with a „Quick Snap“ connection. Changing the optical heads in accordance to the inspection task is a matter of seconds.

Inspection of a CSP

Long-life and very bright, controllable LED lights are integrated in both optical heads and provide optimal illumination of the solder joints. In BGA inspection an additional LED light brush is essential for backlight illumination or to light up very hidden and hard-to-reach areas. Thus soldering errors can be detected quickly and easily with the Ersa MOBILE SCOPE. The Ersa MOBILE SCOPE is supplied together with the well-established ImageDoc Basic inspection software. This software not only displays the live images but also provides various possibilities to document and analyze inspection results.

Extensive accessories allow the operator to compose his individual Ersa MOBILE SCOPE inspection system according to his needs.

A practical aluminium case offers safe storage of the inspection equipment and facilitates the transportation of the system to any location wherever it is needed.

Features of the Ersa MOBILE SCOPE

- High-resolution USB camera
- High-quality BGA optical head (180x)
- Optional 0° optical head (80x)
- Integrated, adjustable LED lighting
- Optional LED fiber optic lighting
- Stand units and further accessories
- ImageDoc Basic or ImageDoc EXP software for both beginners and advanced operators
- Recording, measurement and reporting functions
- Mobile application

Ordering information:

Order number	Description
0VSCA060	**Basic camera unit**
0VSSC060VK1	**Sales kit 1,** for details see page 50
0VSSC060VK2	**Sales kit 2,** for details see page 50
0VSSC060VK3	**Sales kit 3,** for details see page 50

QFP solder joints – taken with the Ersa MOBILE SCOPE MACROZOOM optical head

Ersa ImageDoc Software

Designed for the inspection personnel containing expert documentation!

Reference picture databank, live image with "good/bad" reference images

Database & reporting modules to store process & FA info

Extensive measurement control and labelling functions

Based on the four fundamental principles of "Inspect, Classify, Analyse and Document", the ImageDoc software platform was designed especially for the inspection personnel. Lead-free implementation required a complete re-training of how operators classify solder joint quality. The days of "If the solder joint looks good, it most likely is good!" are over! By means of software guided inspection processes the personnel can be properly trained for lead-free.

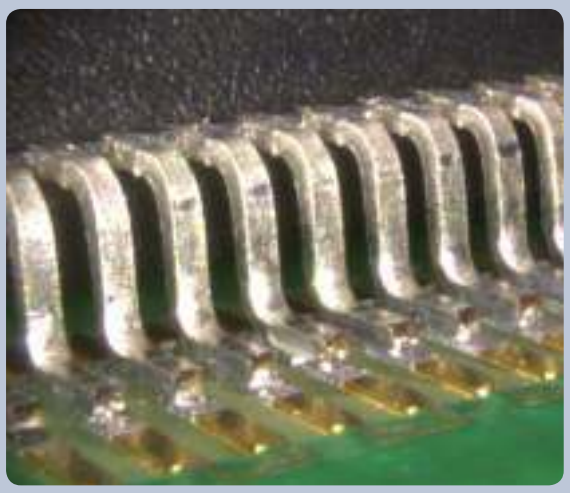
The Ersa ImageDoc software guides the operator through the critical and time consuming process of determining whether a defect exists, and then directs the operator where to look in the process in order to correct the problem. Inspection subjectivity is reduced, problems are solved more quickly and valuable process information is documented for future use.

The included database can be modified and extended by the user at any time. The user can add own reference pictures (with good/bad marking) and problem/solution references.

Features of ImageDoc Basic

- Live and still picture window for documentation and control
- Image database with examples of good and bad solder joints for evaluation purposes
- Reference pictures
- Basic problem/solution database, set up by Ersa, Fraunhofer and the industry
- Measurements and automatic measure control function/calibration
- Image processing and labelling
- Basic reporting/ e-mail out of application
- "Plug & Play" setup

Still sharper views at even more depth
ImageDoc EXP with new image processing functions



"Focus Fusion" – view of QFP solder joints

"Focus Fusion" – view of a BGA printed with solder after it has been placed

The image process function "Best Focus" enables the ERSASCOPE user to easily find the objectively best sharpness setting for any freely determined portion of the image. This is an especially useful feature when measurements are to be taken within the image.

Best Focus – blurred picture in the green framed section (Area of Interest) – red bar graph

Best Focus – focused picture in the green framed section (Area of Interest) – green bar graph

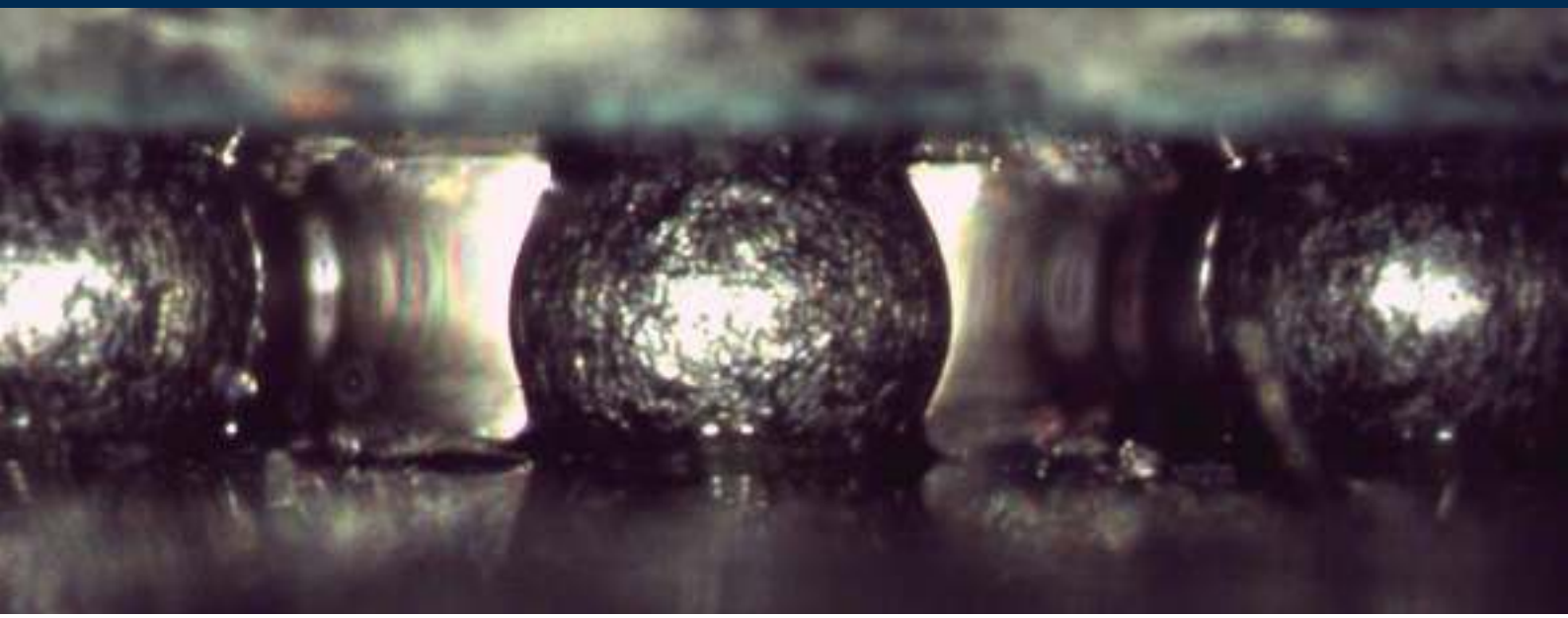
The second function serves to improve the presentation and documentation of the inspection results. With "Focus Fusion", the software calculates a composite image with excellent depth of sharpness from a number of previously recorded images. Balls of a BGA, aligned in one row, can thus be viewed with a high clarity and sharpness, for example. Solder defects or irregular solder joints can be inspected far more easily. The inspection result of a component with high pin-out is documented in only one image.

Both functions are available starting with version 3.0 of the well-proven ImageDoc EXP inspection software. An update is available for existing ERSASCOPE customers.

Features of ImageDoc EXP

- Live and still picture, AVI recording, sequence module, presentation mode
- „Best Focus" and „Focus Fusion"
- Guided failure analysis, spported by an extensive expert database (over 450 MB)
- Reference pictures
- Large problem/solution database, set up by Ersa, Fraunhofer and the industry
- Measurements, automatic measure control function/calibration
- Image processing/labelling, filters and macros
- Network operability, multi-user licensing
- User administration
- Report generation in *.doc and statistics in *.xls/database, import/export, e-mail
- On-line updates and user forum

Inspection applications
Hidden solder joints and further applications



Hidden solder joint inspection is one of the most important areas in a quality assurance program. The images shown on these pages underscore the flexibility of the ERSASCOPE inspection systems.

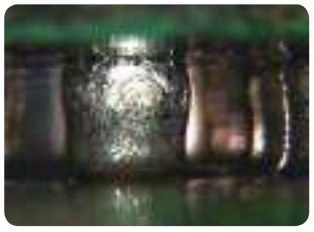
Whether SMDs or THTs, BGAs or Flip-Chips, the ERSASCOPE offers the perfect complement to existing microscopes and X-ray systems for a total quality assurance program.

PBGA – scaling: insufficient heat

BGA: contamination (fibre)

BGA – "dark islands": overheat

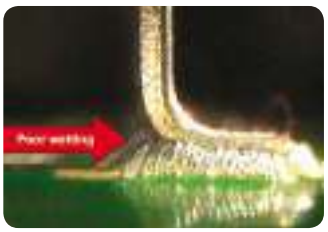
BGA: via hole solder splash



CBGA: good wetting angle

Conformal coating inspection

Lead-free assembly: non-wetting



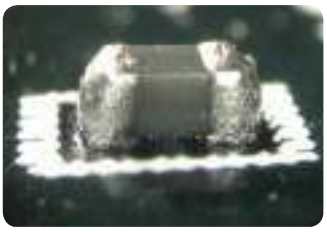
PQFP – interior fillet: poor wetting

PLCC – interior fillet inspection

PBGA – cold joint: insufficient heat

CCGA: insufficient solder

BGA – piggy back: bad alignment

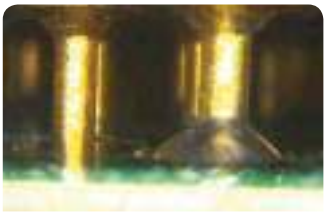


0402: bulbous solder joint

PBGA: tin whisker

Lead-free assembly: non-wetting

BGA – paste print: insufficient solder



PGA – no flow thru: insufficient heat

PBGA – scaling: insufficient heat

Lead-free PLCC: micro crack

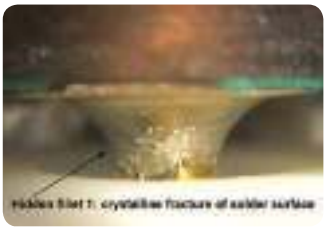
TBGA: disrupted joint & micro crack

Plated thru-hole: disrupted wall

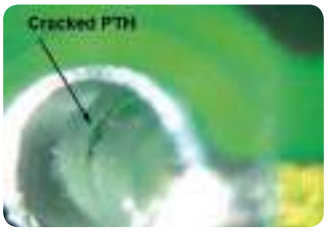
PBGA – scaling: insufficient heat

SMD LED inspection

PBGA – scaling: insufficient heat



THT joint: crystalline fracture



Plated thru-hole: cracked wall

ERSASCOPE 2
System configurations and options

Order number	Description	Technical data	Part
0VSSC600	**ERSASCOPE 2 inspection system,** consisting of:		
0VSSE200-T	**Optical carrier** endoscope with integrated lens and fiber optic system	calibration scale, focus ring and two mechanical irises for front and backlight each	
0VSSE200-90K	**90° optical head** with integrated lens and fiber optic cable	footprint 3 x 6 mm magnification up to 425x* typical inspection gap ~ 300 µm	
0VSSE200-FCK	**Flip-Chip optical head** with integrated lens and fiber optic cable	footprint 1.5 x 4.5 mm (0.6 x 4.0 mm) magnification up to 700x* typical inspection gap ~ 30 µm	
0VSSE200-0K	**0° optical head** for surface inspection	footprint ø 6 mm; magnification up to 250x*	
0VSCA2240	**High-resolution CCD camera** color inspection camera	SXGA, digital (USB 2.0) manual or auto white balance 1.3 million pixels; 1/3“ CCD chip	
0VSTV200	**TV adapter** connects optical carrier to CCD camera	60 mm focal length C-type mount	
0VSLS400	**LED light source** with electronic light quantity regulation and brightness presets	(W x H x D): approx. 170 x 196 x 98 mm 12 VDC, 5,420 mA, max. 65 W weight approx. 2.1 kg	
0VSLR200 ●	**Light regulator for gooseneck**	mechanical iris adjusts from 0 to 100 %	
0VSLLVL200 ●	**Fiber optic light guide extension**	length 200 mm	
0VSLF200 ●	**Light brush**	length 35 mm, width 5 mm	
0VSLF300 ●	**Flat light brush**	length 80 mm, width approx. 10 to 35 mm	
0VSRM100 ●	**Glass calibration scale**	10 µm lines at 100 µm pitch	
0VSLC100 ●	**Lens cleaning kit**	cleaning cloth, papers and liquid	
3VP00640 ●	**Storage case**	(W x H x D): ~ 325 x 230 x 110 mm aluminium with padded insert	
0VSST210	**ERSASCOPE stand** with z-axis micrometer adjustment; integrated fiber optic cables and camera cables	(W x H x D): ~ 500 x 400 x 520 mm total weight ~ 5 kg surface: antistatic includes 1,000 mm coated fiber optic cable with gooseneck	
0VSXY100	**ERSASCOPE 2 table** with 4 PCB supports	X-Y-θ movement with fine adjustment and antistatic mat with grid dimensions: ø 320 mm; weight: ~ 5 kg	
0VSID300L ● ●	**ImageDoc EXP 3.x**	upgrade licence for ImageDoc EXP professional inspection software	
0VSID135	**ImageDoc Basic**	general inspection software	

● = option for ERSASCOPE 1 ● = option for ERSASCOPE 2 * 20“ monitor, resolution 1,600 x 1,200 pixels, no digital zoom

ERSASCOPE 1
System configurations and options

Order number	Description	Technical data	Part
0VSSC070	**ERSASCOPE 1 inspection system,** consisting of:		
0VSSE100	**ERSASCOPE 1** endoscope with integrated lens and fiber optic cable	focus ring and adjustable backlight footprint 1.5 x 4.5 mm magnification up to 400x* typical inspection gap ~ 300 µm	
0VSCA1225	**Digital color camera with USB port**	digital (USB 2.0) manual or auto white balance 1/3" CMOS chip	
0VSTV036	**TV adapter** connects optical carrier to CCD camera	60 mm focal length C-type mount	
0VSLS070	**Halogen light source** adjustable	(W x H x D): 130 x 55 x 235 mm 220 V - 240 V~, 50 Hz, 45 W or 115 V - 127 V~, 60 Hz, 45 W weight: ~ 1.8 kg	
0VSST210	**ERSASCOPE stand** with z-axis micrometer adjustment; integrated fiber optic cables and camera cables	(W x H x D): ~ 500 x 400 x 520 mm total weight ~ 5 kg surface: antistatic includes 1,000 mm coated fiber optic cable with gooseneck	
0VSXY090	**ERSASCOPE 1 table** with 4 PCB supports	x/y movement with fine adjusment; antistatic mat with grid dimensions: ø 320 mm; weight: ~ 3 kg	
0VSID135	**ImageDoc Basic**	general inspection software	

Order number	Description	Technical data	Part
0VSUP6XL ● ●	**XL Upgrade Kit** upgrades the ERSASCOPE stand and table for inspection of very large PCBs	antistatic XL table (600 x 700 mm), telescopic arm, optical carrier system and fiber optic light guide extension	
0VSMS100 ●	**MAGNISCOPE head** 0° static endoscope with integrated lens and fiber optic cable	focus ring, magnification up to 400x*	
0VSMZ100 ● ●	**MACROZOOM head** for high-magnification top-view surface inspection	70x zoom lens aperture adjustment: F 5.6 – 32 C focal length: 180 – 450 mm	
0VSFR100 ● ●	**MACROZOOM ring light**	fiber optic ring light	
0VSMZ300H ● 0VSMZ200H ●	**MACROZOOM holder**	connects optical head to the stand	
0VSSC600VK ●	**ERSASCOPE 2 Upgrade Kit** upgrade to ERSASCOPE 2	for complete ordering information, please contact your Ersa representative directly	

● = option for ERSASCOPE 1 ● = option for ERSASCOPE 2

* 20" monitor, resolution 1,600 x 1,200 pixels, no digital zoom

Ersa MOBILE SCOPE
System configurations and options

Basic camera unit	Description
Image sensor	1/3" N-MOS solid state color image sensor
Number of effective pixels	1,600 (H) x 1,200 (V) pixels (UXGA / 2.0 MP)
Interface	USB 2.0 serial bus
Dimensions	114 (L) x 36 (W) x 51 (H) mm, without cable

0VSCA060

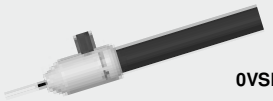
BGA 90° optical head	Description
On-screen magnification	~ 180x – 15x on 14" monitor
Working distance range	~ 0.5 – 30 mm (focusing range)
Field of view	~ 2.0 – 24 mm
Illumination	integrated long-life cool white LED illumination

0VSSE060-90K

MACROZOOM head 80x with LED light	Description
On-screen magnification	~ 80x – 8x on 14" monitor
Working distance range	~ 5 – 200 mm
Field of view	~ 5 – 45 mm
Illumination	integrated long-life cool white LED illumination
Dimensions	43 (L) x 19 (ø) mm (max. 85 x 35 mm)

0VSSE060-MZ80

LED light brush	Description
Illumination	Cool white LED illumination
Illumination level	64 x 0.250 mm (ø) plastic optical fibers
Power source	3 x AA (LR06) batteries (alcaline cells recommended)
Dimensions	ø 26 x 250 mm (max. 40 x 250 mm)



0VSLS030

Ersa MOBILE SCOPE sales kits

Order number	0VSSC060VK1	0VSSC060VK2	0VSSC060VK3
Basic camera unit, digital	1x	1x	1x
BGA lens, 90° optical head	1x	--	1x
MACROZOOM lens 80x with LED light	--	1x	1x
LED light brush with dimmer	1x	--	1x
Desktop holder for camera unit	1x	--	1x
Operating manual	1x	1x	1x
ImageDoc Basic (inspection software)	1x	1x	1x
Aluminium case for Ersa MOBILE SCOPE	--	--	1x

Ersa MOBILE SCOPE accessories

Product name	Order number
Stand unit, height adjustable, with fine adjustment	**0VSST060**
Stand unit, height adjustable	**0VSST065**
x/y table	**0VSXY060**
Stand for LED light brush	**0VSLS030H**
Foot switch for image capture, with USB port	**0VSCA060FS**
Ersa lens cleaning kit	**0VSLC100**
Aluminium case for Ersa MOBILE SCOPE	**3VP00703**