

Instructions Manual

Model BGA Inspection System

Contents

1. General Instructions.....	3
Safety concept.....	3
Cleaning.....	3
ESD Protection.....	4
Servicing.....	4
Responsibilities of person in charge of the instrument.....	4
2. Symbols Used.....	5
3. Safety Instructions.....	6
Intended use.....	6
Non-intended use.....	6
Transport.....	6
Integration in third-party products.....	7
Health risks.....	7
Declaration of Conformity and applied standards.....	7
4. Introduction.....	8
5. Items included when you order System Basics, BGA-001:.....	9
6. Items included when you order System ProX, BGA-002:.....	10
7. System Overview	11
Digital Microscope with Side-view Lens.....	11
Digital Microscope with Top-view Lens.....	11
Stand.....	12
Precision XY-Stage.....	12
Illumination system.....	13
Computer interface	14
Software.....	14
Foot switch and Calibration scale.....	14
8. Installation/Assembly.....	15
Mounting BGA lens or 8-80x lens on Digital Microscope.....	15
Mounting Stand and XY-Stage.....	16
Mounting Digital Microscope on Stand.....	17
Mounting Fibreoptics background light with gooseneck.....	18
Mounting Microprism background light with rails	19
Installing device drivers on computer.....	20
Installing INSPECTIS software on computer.....	20
Running INSPECTIS for the First Time.....	21
Digital Microscope Device Settings.....	22
9. Instrument Setup.....	20
10. Troubleshooting.....	23
Computer system requirement.....	24

1. General Instructions

Safety concept

- Do not scratch or hit optical surfaces of the micro-prisms onto components or other hard objects on PCBs! This precaution is important especially when you move down the BGA inspection microscope next to the BGA component.
- Never knock or drop the digital microscope or lenses.
- Keep the equipment clean.
- Keep the equipment away from direct sun-light, heat and high humidity.
- Protect your BGA inspection system from fumes, acids and from alkaline, caustic, or corrosive materials. Keep chemicals away from the instruments
- Store digital microscope, lenses and background lights inside supplied aluminium case when not used for a long time.
- Put a dust cover over the equipment when not in use.
- Only use accessories provided or approved by Inspectis.

Cleaning

- Use lens cleaning tissue or soft cotton swaps damped with pure Ethanol or Isopropyl alcohol for cleaning optical surfaces of the device.
- Use soft micro fibre tissue damped in warm water for cleaning metallic or plastic part of the equipment.
- Never use Acetone or other similar solvents for cleaning.
- Do not use any unsuitable cleaning agents or chemicals for cleaning the equipment.



This equipment is a precision optical device and shall be handled with great care!



Be careful not to scratch or hit front edge of the side viewing micro prisms onto hard objects!

ESD Protection

- Use the equipment on ESD protected bench with GND connection.
- Attach matt of the XY-precision table to GND by supplied GND cable for ESD protection.
- Attach Fibreoptics Brush-light to GND by supplied GND cable. Doing this will also connect Digital Microscope, lenses and Stand to GND for ESD protection.

Servicing

- Repairs may only be carried out by Inspectis or Inspectis-trained service technicians.
- Only original Inspectis spare parts may be used.

Responsibilities of person in charge of the instrument

- Make sure the equipment is operated and maintained by authorized and trained personnel only.

2. Symbols Used

Warning, Safety hazard!



This symbol indicates especially important information that is mandatory to read and observe.

Failure to comply can cause the following:

- Hazards to personnel
- Functional disturbances or damaged instruments

Warning of hazardous electrical voltage



Never open power the device or its components as you could otherwise risk physical injury or damage.

Failure to comply can cause the following:

- Hazards to personnel
- Functional disturbances or damaged instruments

Dangerous optical radiation.



This symbol warns against directly looking into the LED beam of the illumination equipment – either with or without optical instruments.

Failure to observe this notice poses a risk of eye damage

Important information



This symbol indicates additional information or explanations that are intended to provide clarity.

3. Safety Instructions

Intended use

Inspectis BGA Inspection system is an optical instrument which uses side view microscopes optics and digital image sensor for visualization of objects, their details, and specimens.

This equipment is intended for optical visual inspection of electronic components and PCBs together with a computer within industrial applications.

Non-intended use

- The Inspectis BGA inspection system and its components shall never be used for medical and/or in vitro diagnostics (IVD) applications.
- Inspectis or its authorised reseller must be consulted whenever the instrument is altered, modified, or used together with non-Inspectis components that are outside of the scope of this manual!
- Unauthorised alteration of the instrument or non-compliant use voids all rights to any warranty claims.

Transport

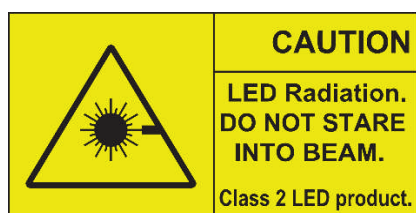
- Use the supplied aluminium case for shipping or transporting the BGA digital microscope and accessories.
- If equipment needs to be shipped to different locations frequently, order and use the Inspectis Flight Case with foam inlay for BGA inspection system.
- To prevent damage during transportation, disassemble sub-systems according to this User Manual and pack them separately in supplied Aluminium Case or optional Flight Case.

Integration in third-party products

Consult Inspectis or authorised Inspectis reseller if you intend to integrate the equipment in third-party products.

Health risks

Illumination system of the equipment is in risk group 2 according to EN 62471:2008 when used according to its intended use.



Never look directly into the LED beam of the illumination equipment – either with or without optical instruments. Failure to observe this notice poses a risk of eye damage.

Declaration of Conformity and applied standards

2001/95/EC General product safety

2014/30/EU Electromagnetic compatibility (EMC)

2011/65/EU Restriction of hazardous substances (RoHS)

Emission: EN 55022:2010 class A, EN 61000-6-4:2001

Immunity: EN 61000-4-2, -3, -4, -6

Environmental: EN IEC 63000:2016

This equipment complies with the protection requirements of the above directives.

4. Introduction

Congratulations!

Congratulations on purchasing the Inspectis BGA digital inspection system. The special design of this equipment makes it a flexible and easy-to-operate tool for fast and flexible inspection, measurement, and documentation of hidden solder joints of BGA, μ BGA, FlipChip, CSP, CGA as well as other SMD components.

High-resolution display on the computer screen

The Inspectis BGA digital inspection system is connected to a computer via an integrated high-speed USB3.0 output. The microscope image is viewed in INSPECTIS© software and shown on the computer monitor.

High resolution optics coupled with the built-in high-power lighting system and fast USB3.0 camera interface, produces clear, crisp and high frame-rate real-time video of the inspection objects.

INSPECTIS© for BGA software

Powerful image view, capture and metrology software, specially designed for Inspectis range of Digital Microscopes. With a logical layout and graphical icons for each function, you can quickly become familiar with the software, saving time during inspection and measurement routines and reducing the need for training sessions.

User-friendly in all detail

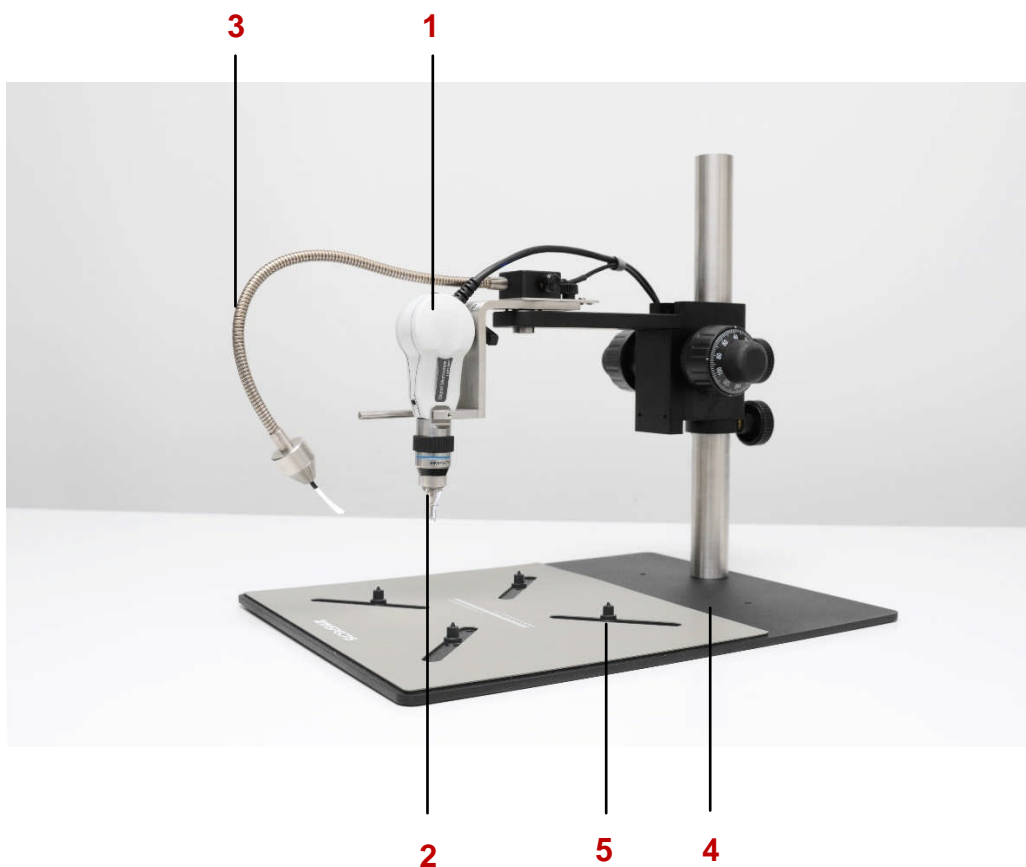
Like every digital camera, the Leica DVM6's integrated camera reacts differently to different light sources. However, the white balance is matched to LED illumination from Leica at the factory. This means that if you use a Leica LED illumination, you automatically obtain the best results! The Leica DVM6 and its integrated light sources, i.e. LED ring light illumination and coaxial illumination, are factory-set to ensure you receive the best results automatically.

5. Items included when you order System Basics, BGA-001:

Your standard BGA-001 “Side-view BGA Inspection System Basics” delivers with the following items:

- | No. | Item Name |
|-----|---|
| 1 | Digital Microscope, 5MP, USB3.0 |
| 2 | Interchangeable 90° side-view BGA inspection lens |
| 3 | Fiber Optics Background Illumination Unit with High-power LED light source |
| 4 | Inspectis Stand with Rack&Pinion, soft-touch and pivoting bracket for BGA microscope, standard size |
| 5 | Magnetic pegs (4x kit) |
| 6 | INSPECTIS© Basics BGA Inspection software |
| 7 | Aluminum Carrying Case |
| - | Annual Service and Support for INSPECTIS software (one year) |
| - | Instructions Manual and other documents |

One-year “Service and Support for INSPECTIS software” is already included in your system. For software support and future updates after first year, please sign and return the “Annual Service and Support Agreement” to info@inspect-is.com or to the authorised Inspectis reseller.

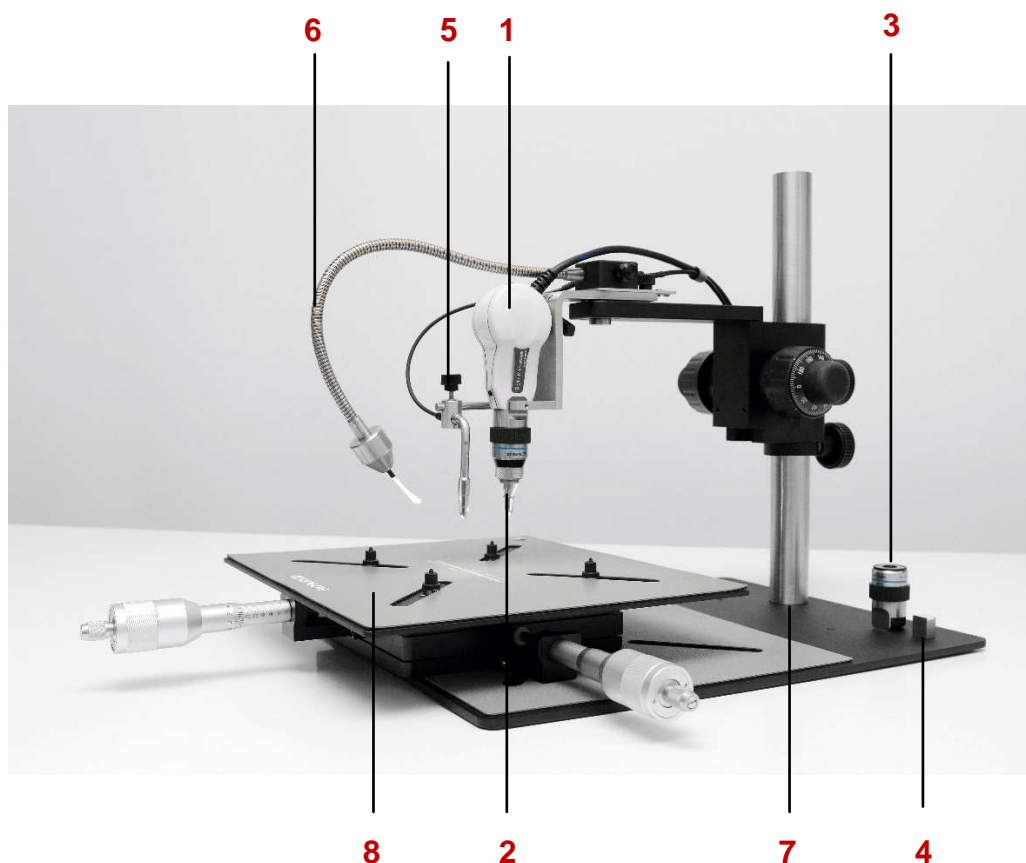


6. Items included when you order System ProX, BGA-002:

Your standard BGA-002 “Side-view BGA Inspection System ProX” delivers with the following items:

- | No. | Item Name |
|-----|---|
| 1 | Digital Microscope, 5MP, USB3.0 |
| 2 | Interchangeable 90° side-view BGA inspection lens |
| 3 | Interchangeable 8-80x top-view varifocal lens |
| 4 | Calibration Micrometer Scale for BGA |
| 5 | Microprism Background Illumination Unit with LED light source |
| 6 | Fiber Optics Background Illumination Unit with High-power LED light source |
| 7 | Stand with Rack&Pinion, soft-touch and pivoting bracket for BGA microscope, standard size |
| 8 | Precision XY-stage with antistatic mat and magnetic pegs |
| 9 | USB Foot switch for INSPECTIS© Software, 1-pedal |
| 10 | INSPECTIS© ProX BGA Inspection software |
| 11 | Aluminum Carrying Case |
| - | Annual Service and Support for INSPECTIS software (one year) |
| - | Instructions Manual and other documents |

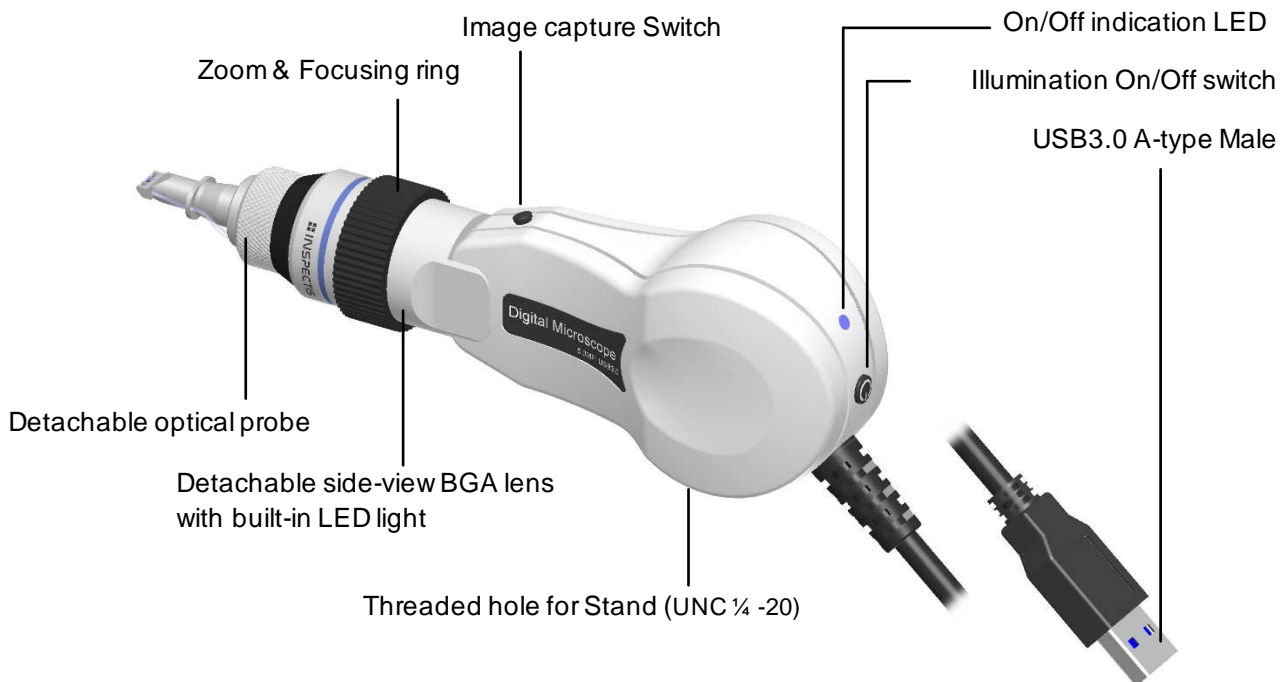
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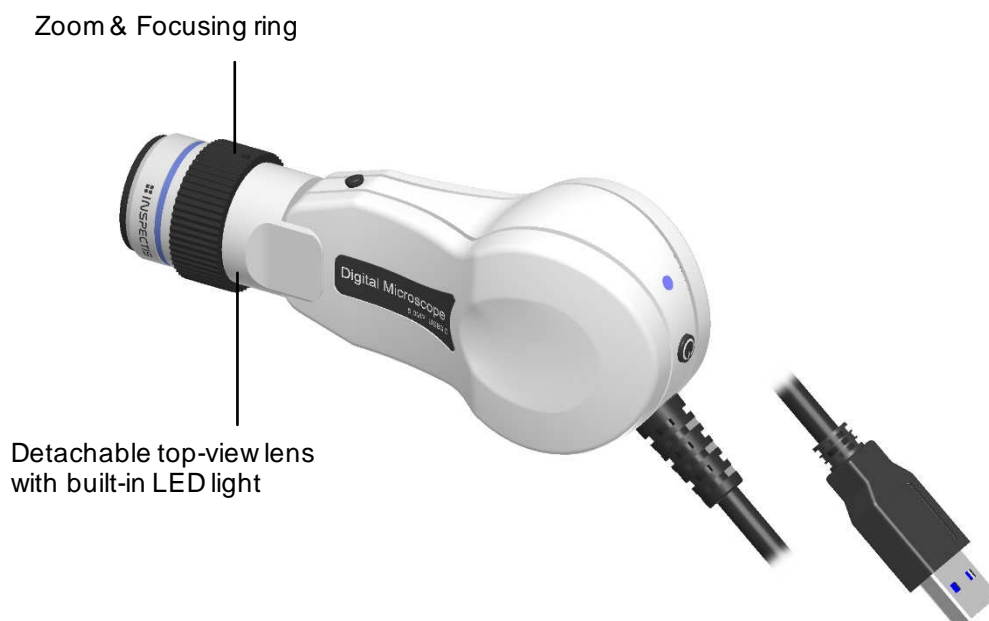
7. System Overview

Inspectis BGA Inspection System includes a hand-held Digital Microscope with USB3.0 interface equipped and a detachable side-view BGA lens. BGA lens can be switched with 8-80x lens for top-view inspection of other components and solders on PCB.

Digital Microscope with Side-view Lens

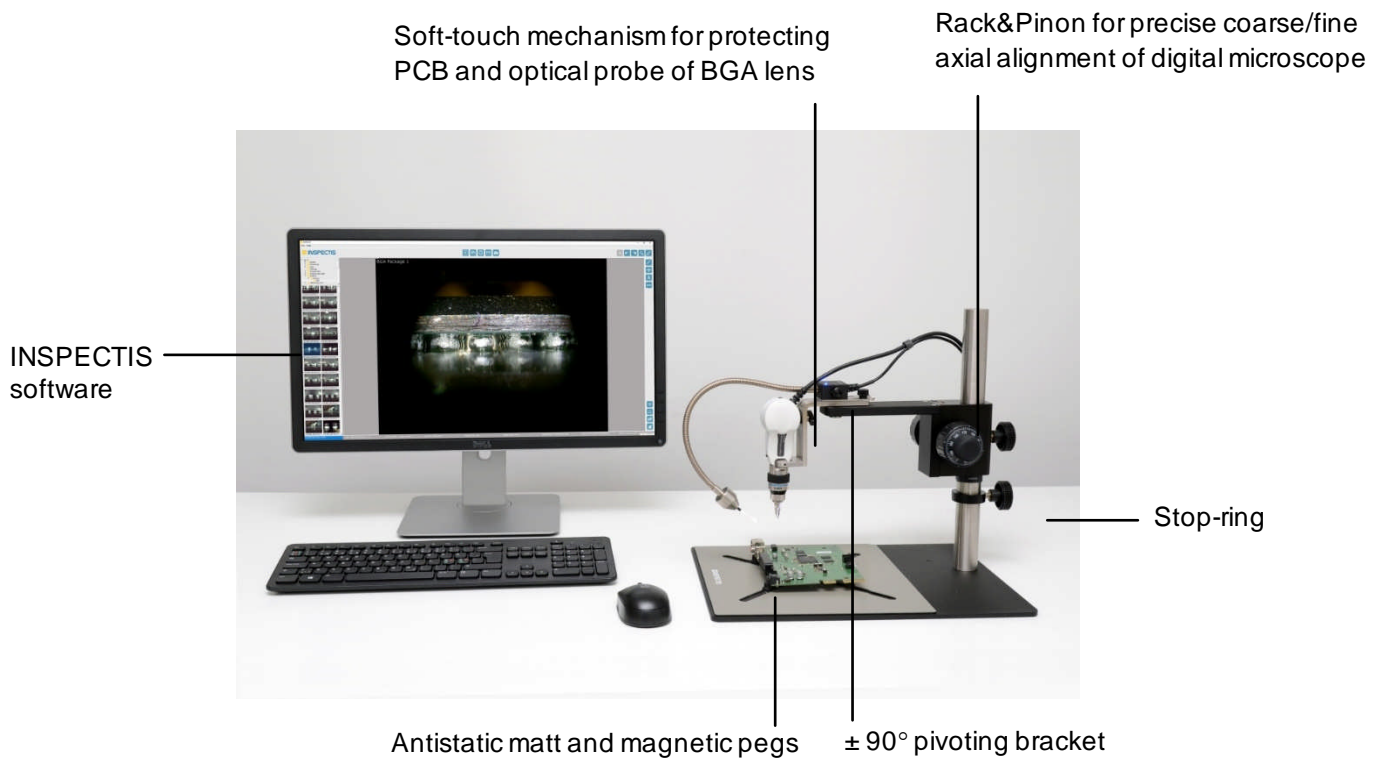


Digital Microscope with Top-view Lens



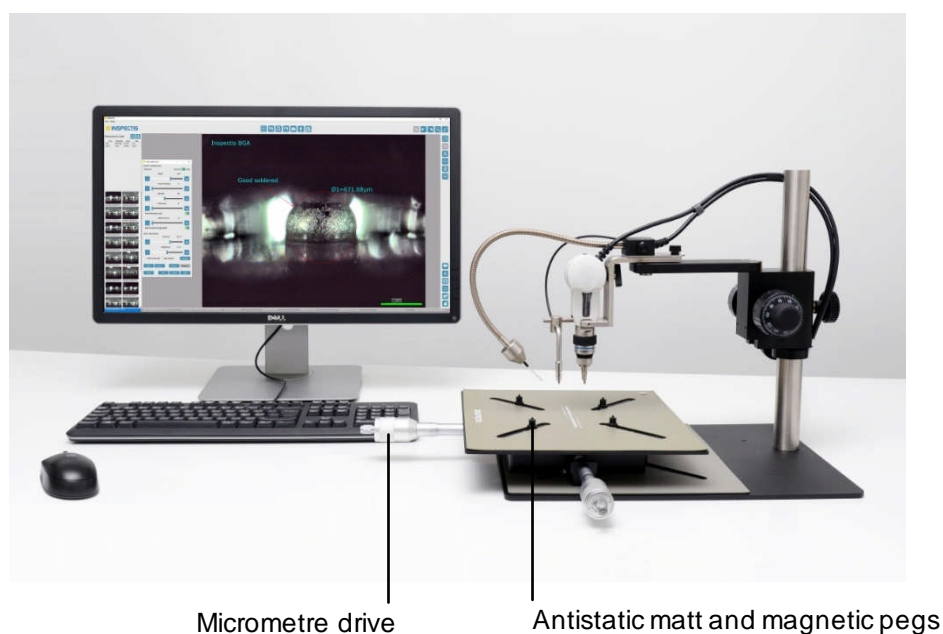
Stand

Digital Microscope can operate hand-held but recommends to be mounted on provided stand containing rack&pinion axial movement, soft-touch mechanism and pivoting bracket.



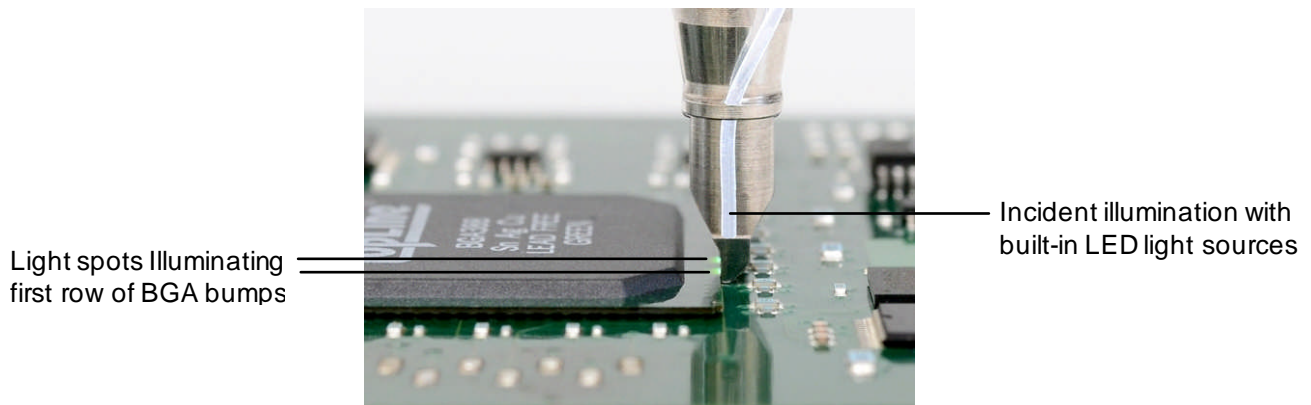
Precision XY-Stage

For stable holding of PCB and accurate displacement of the BGA package under inspection a precision XY-stage with antistatic mat and magnetic pegs is provided. XY-stage is simply put on the baseplate of stand. Travel range of the XY movement is 50mm.



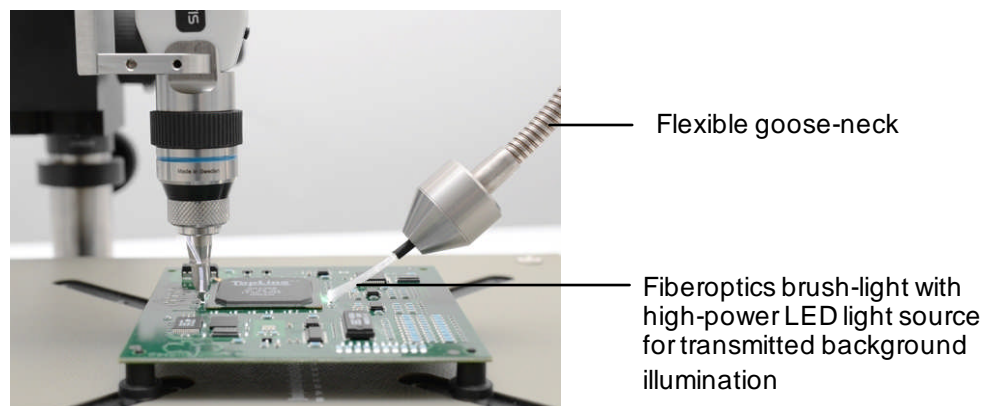
Illumination system

Side-view BGA lens has a built-in incident lighting system for illumination of first row of BGA solder balls. Light intensity level of the incident light is fix and cannot be changed.

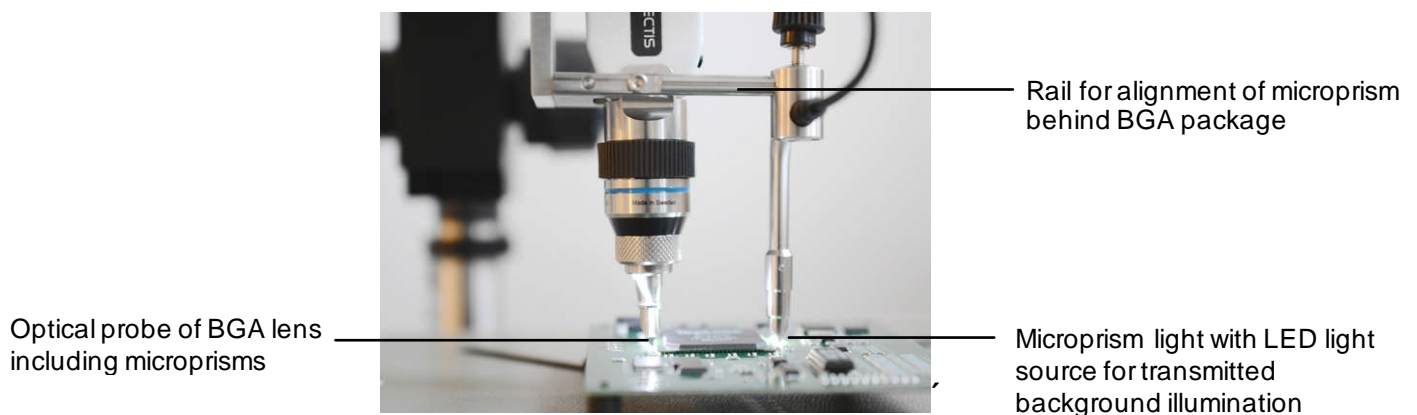


For lighting to image other rows of solder bumps underneath BGA component two different transmitted background illumination systems are provided.

Fiberoptics brush-light back-ground light on flexible goose-neck arm:



and Microprism background illumination on distance-adjuster rail:



Light intensity level of both Fiberoptics brush-light and Microprism light can be adjusted.

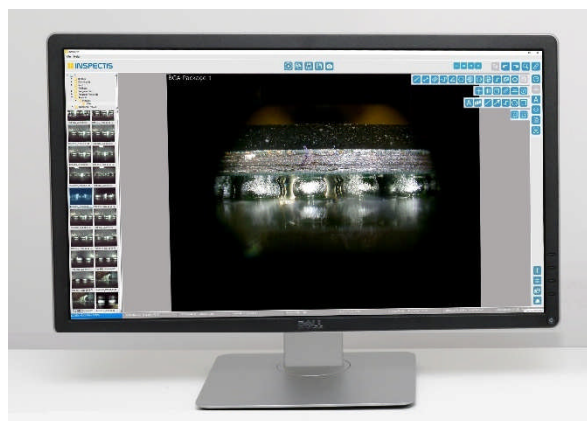
Computer interface

Digital microscope is connected to USB3.0 port of a computer. To stream the live video into the computer, device drivers of the digital microscope shall be installed on computer.



Software

For image view, capture, analysis, measurement and reporting, INSPECTIS© Basics or ProX BGA Inspection software is provided depending on your order.



Foot switch and Calibration scale

A foot switch for hand-free image capture and a micrometer scale for calibration of magnifications are also provided together with ProX system.



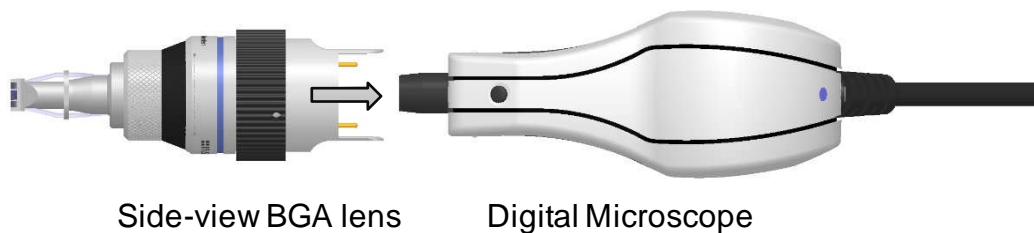
Foot switch is plugged into the USB port of computer and automatically recognized by the Inspectis software.

8. Installation/Assembly

Mounting BGA lens or 8-80x lens on Digital Microscope

Digital microscope is normally delivered with BGA lens attached.

If not, align the lens and gently push it onto the digital microscope to click!



Grip the lens and pull it back gently to detach from digital microscope.



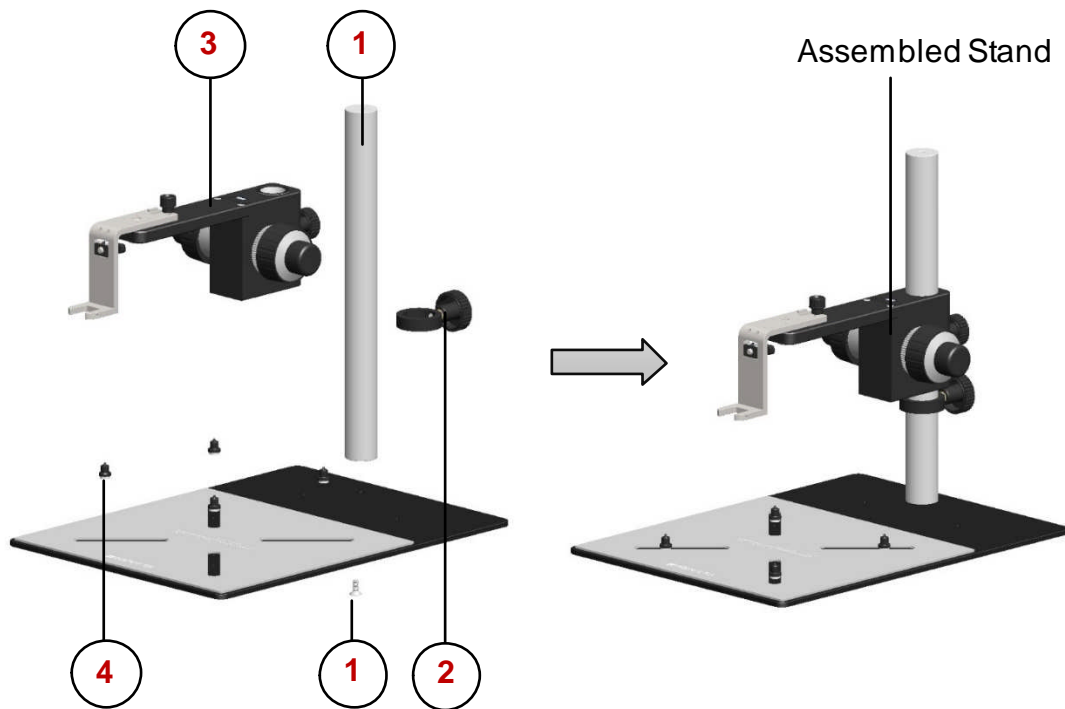
Be careful 4x electric connection pins on the lens is aligned to the mating holes before pushing the lens onto the digital microscope.



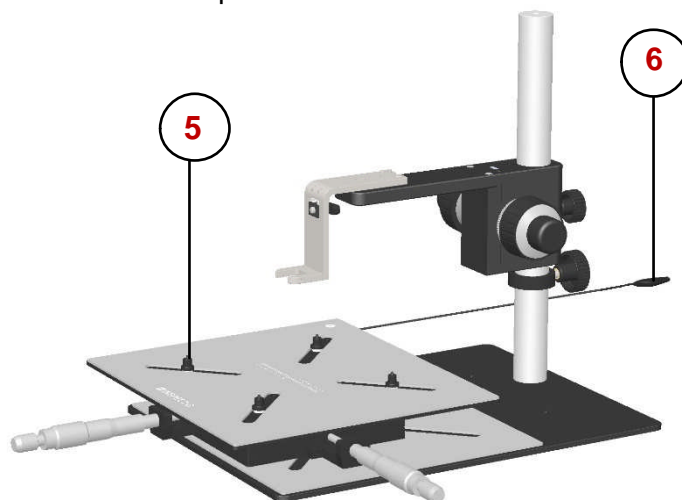
Always keep the lenses into their box inside aluminum case.

Mounting Stand and XY-Stage

1. Assemble vertical post and tighten it by provided countersunk M6 screw.
2. Insert Stop-ring and fix it at approximately middle of the vertical post.
3. Insert course/fine Rack&Pinion unit and secure it properly.
4. Place magnetic pegs in their slots on base-plat of Stand.



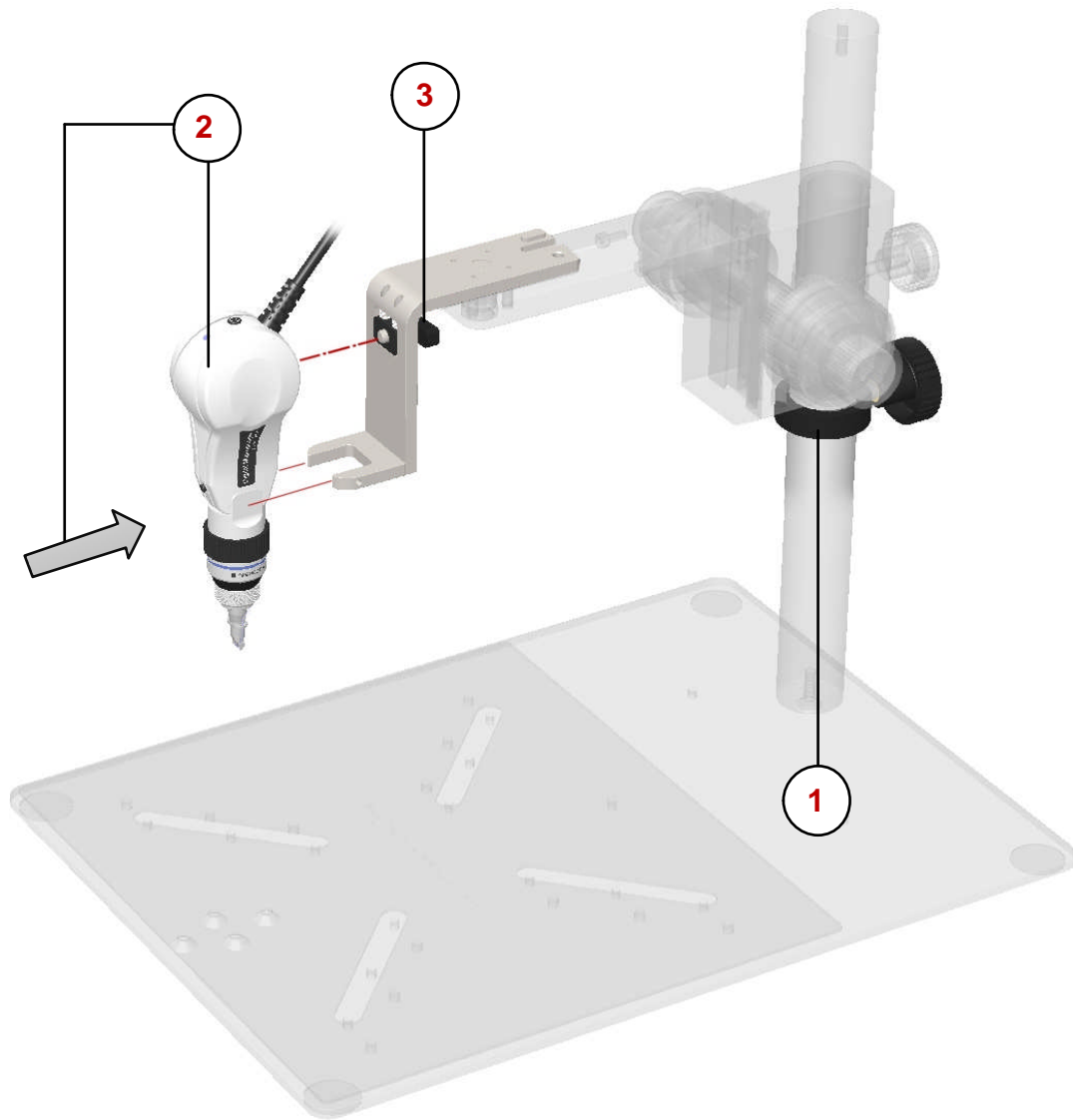
5. Place the magnetic pegs on XY-Stage if you are using this device.
6. Attach the provided GND cable to XY-Stage and to the GND connection point of the working bench for best ESD protection.



Make sure the stop-ring (2) is at right vertical position and tightened well to protect digital microscope and BGA lens from unintended falling onto the PCB.

Mounting Digital Microscope on Stand

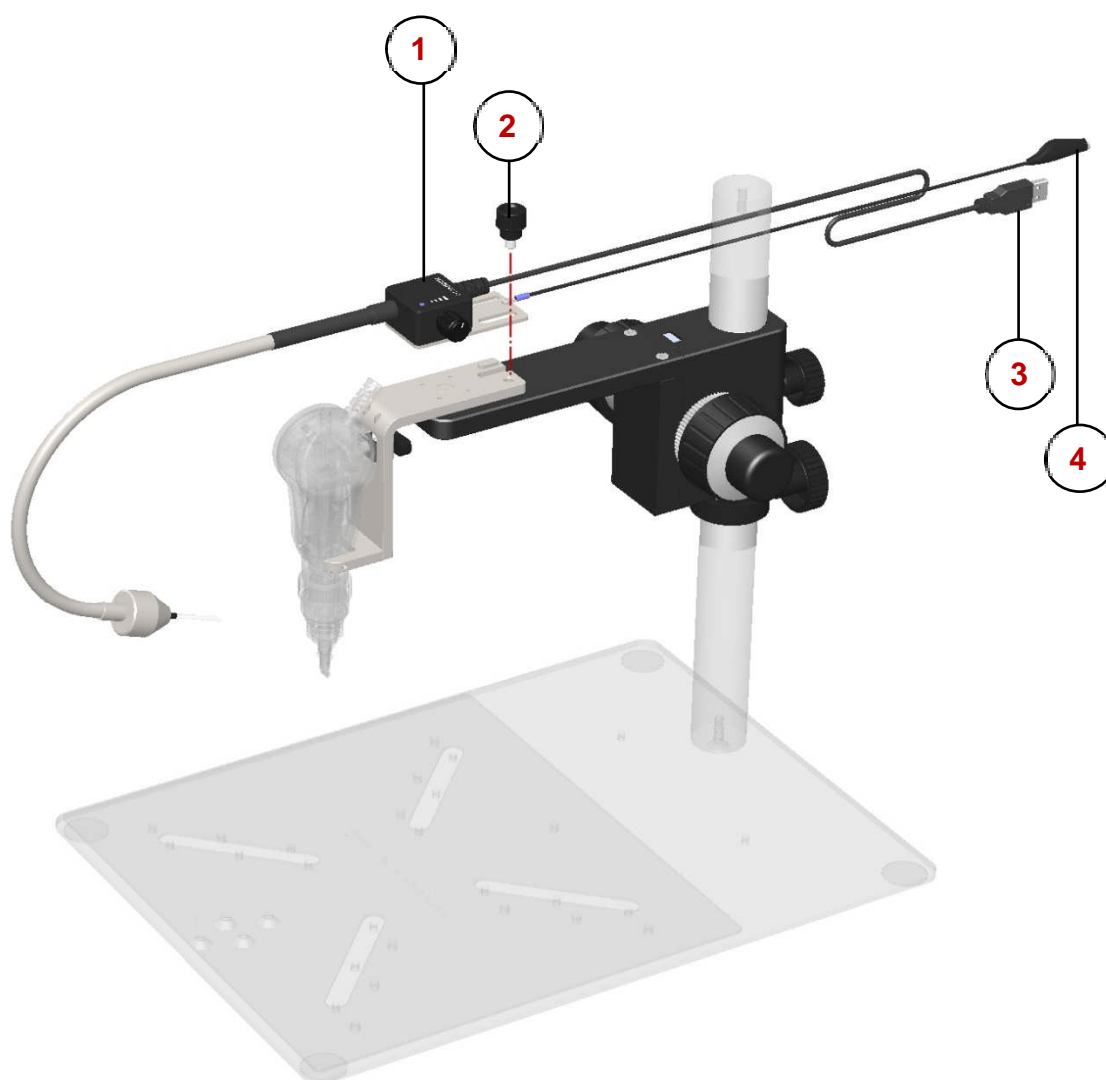
1. Make sure Rack&Pinon unit is secured properly and the Stop-ring is tightened at right height.
2. Align side-wings of the BGA lens to the stand bracket and insert it.
3. Tighten the wing-screw to secure Digital Microscope.



Make sure digital microscope can be freely moved up approximately 2mm by the spring loaded soft-touch mechanism.

Mounting Fiberoptics background light with gooseneck

1. Position Fiberoptics brush light device on pivoting bracket of Stand as shown below.
2. Secure it by the knob-screw.
3. Attach USB cable to the computer for power. USB2.0 or USB3.0 A-type input.
4. Attach GND cable to the GND connection point of the working bench for ESD protection.



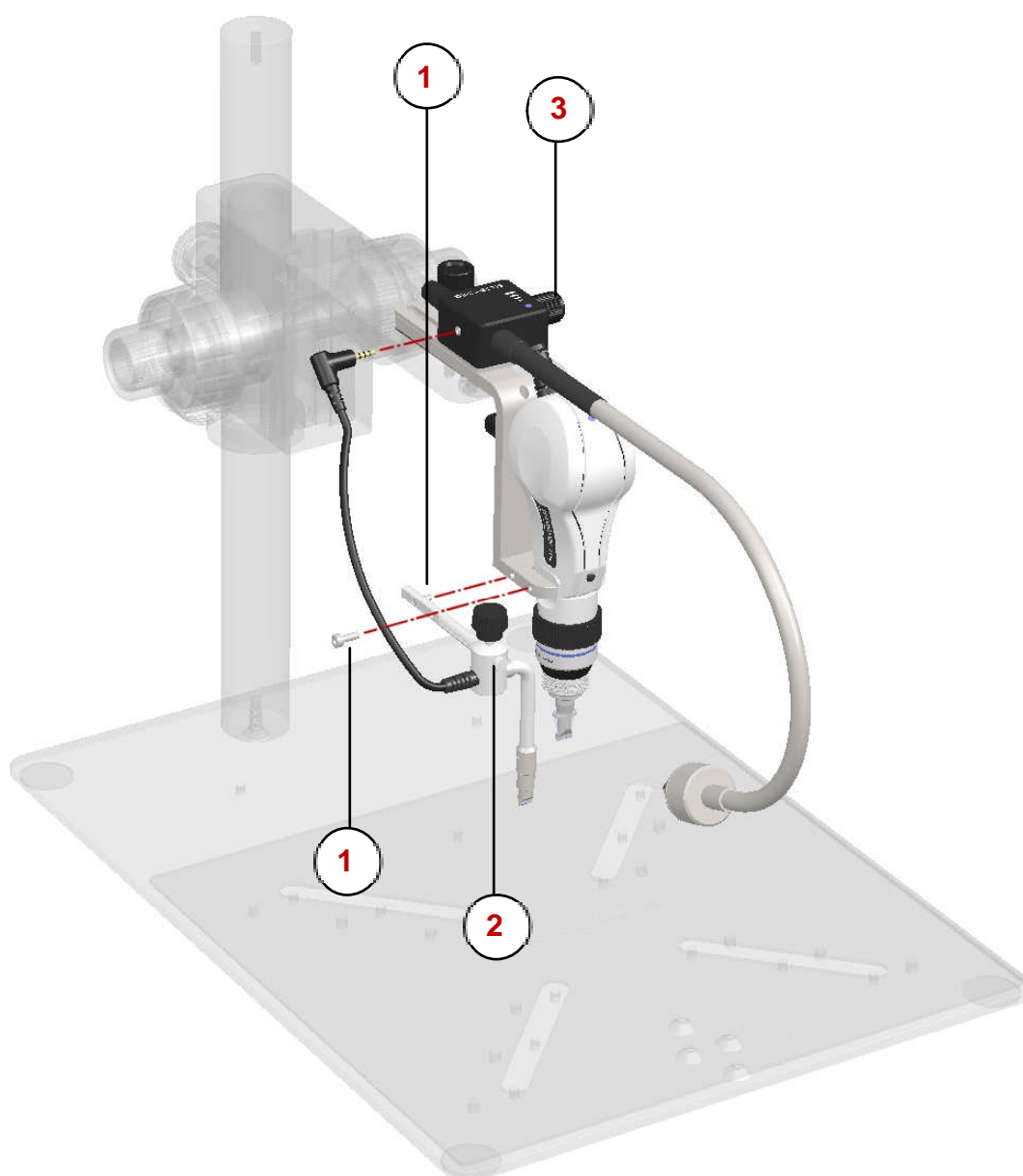
BGA lens and its optical probe will also be electrically connected to Earth via GND cable of the fiberoptics background light.



Don't look directly into the LED beam of the illumination equipment – either with or without optical instruments.

Mounting Microprism background light with rails

1. Slider shaft of the Microprism background light is normally pre-mounted on pivoting bracket of the Stand. If shaft is not mounted, attach it to the bracket by inserting the circular pin and tighten it by provided HEX screw as shown below.
2. Insert then Microprism background light onto the shaft and fixed it by tightening thumb-screw.
3. Attach its power cable to DC-output of the Brush-light controller unit.



Intensity level of the Microprism background light is controlled by dimmer control knob.

9. Instrument Setup

Installing device drivers on computer

To install Device Drivers of Digital Microscope, run the installation file on provided flash memory stick.

1. Select “Digital Microscope Device Drivers 2.8.5” folder and run drvInstaller.exe
2. Attach Digital Microscope to a free USB3.0 port of your computer.
3. Follow on-screen instruction to complete the installation.



Make sure digital microscope is attached to USB3.0 or USB3.1 port of the computer. Connecting to USB2.0 port will cause low frame rate and malfunction of the device.

Installing INSPECTIS software on computer

To install INSPECTIS software run the installation file (Inspectis V6.x Setup) on provided flash memory stick.



Installation shall be done with full administration privileges.
You might need to disable antivirus system of your computer temporary during the installation.

Running INSPECTIS for the First Time

1. Before launching INSPECTIS software please make sure the Digital Microscope is connected to the computer.
2. For INSPECTIS ProX, insert the software protection dongle into a free USB port on computer. The protection dongle will be found inside the product box.
3. Click on INSPECTIS shortcut on the desktop or from Windows main menu to run INSPECTIS software.
4. Select language from the list.
5. From the "Software Version" selection window, select:
 - "INSPECTIS ProX" if a full license has been ordered System ProX BGA-002 with the software protection USB dongle. All software functions will be enabled.
 - "INSPECTIS Basics" if you have ordered System Basics BGA-001.
6. Fill in license number (found in the package) and the other requested information.
7. Software will automatically detect and select the installed INSPECTIS device.






PLEASE READ THE LICENSE AGREEMENT CAREFULLY before using INSPECTIS software.



You are allowed to install INSPECTIS software on 3 individual computers according to license agreement.

Digital Microscope Device Settings

1. Click  to show the Device Settings group.
2. To select Digital Microscope from the list of available devices, click  under Device Settings group and select “Inspectis 5MP Camera”.
3. To automatically select your device, click  under Device Settings group. Software will search for Inspectis devices and select “Inspectis 5MP Camera” accordingly.
4. To restart your device while software is running, press F12 on your computer keyboard.



INSPECTIS software shows the device names accordingly on the status bar.



For more information on how to use INSPECTIS, please refer to User’s manual of the software.

10. Troubleshooting

No live image on computer

Make sure you have installed Digital Microscope device drivers. Drivers can be found on provided USB flash memory.

Image is too bright or too dark


Select one of the pre-defined camera setups  and/or adjust Image Brightness and/or Target value for Exposure time.

Image is out of focus

Adjust focus by turning focusing ring of the BGA lens (or the 8-80x lens).

Image is blurry

Make sure optical surface of microprisms on BGA lens are clean. Wipe the surface using cotton swabs damped in pure alcohol.

Make sure edge of the middle microprism is not chipped or damaged.

11. System requirement

Component	Minimum specification
CPU	Intel Core i5 Recommended: Core i7, CPU @ 3.3 GHz or faster
Operating System	Windows 7/8.1/10 (x64 version Professional, Enterprise)
Memory	8 GB or higher of RAM
Hard disk	200 GB of Free Space
Display	Laptop: 15.6" / 1920 x 1080 (Full HD) PC: 24"-27" / 3840 x 2160 (4K)
Ports	One USB 3.0 port Two USB 2.0 port

Recommended computers by Inspectis:

- **Station:** HP Workstation Z2, Intel Core i7, 16 GB
- **Laptop:** HP ProBook, Intel Core i7, 15.6", 8 GB, Full HD

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