

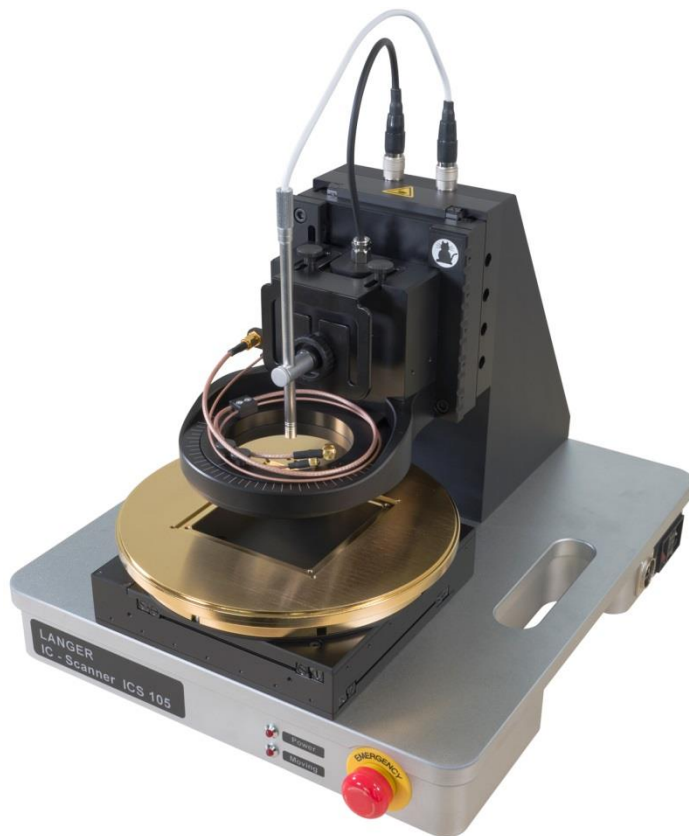
LANGER
EMV-Technik

IC TEST SYSTEM

User manual

ICS 105 set

IC scanner 4-axis positioning system



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- Translation of the original user manual -

2020.04.28 IC-Scanner ICS 105 user manual

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1 Declaration of Conformity

Manufacturer:

Langer EMV-Technik GmbH
Nöthnitzer Hang 31
01728 Bannewitz
Germany

Langer EMV-Technik GmbH herewith declares that the product

ICS 105 set, IC scanner 4-axis positioning system

conforms with the following relevant regulations:

- Machinery Directive 2006/42 EC
- EMC Directive 2014/30/EU
- RoHS 2011/65/EU

The system complies with the safety objectives of the Low Voltage Directive 2014/35/EU, pursuant to Annex I, Section 1.5.1 of Machinery Directive 2006/42 EC.

The following applicable standards were used to implement the requirements specified by the aforementioned directives:

- DIN EN ISO 12100:2011 (Safety of Machinery)
- DIN EN 60204-1:2014-10 (Safety of Machinery)
- EN 61000-6-4:2007 (EMC - Emission)
- EN 61000-6-2:2006 (EMC - Immunity)
- DIN EN 50581:2013-02 (Restriction of Hazardous Substances)

Name of the person authorized to compile the technical file:

Gunter Langer

Bannewitz, 02.04.2019



(Signature)

G. Langer, Managing Director

2 General

2.1 Storing the user manual

This user manual provides the basis for the safe and efficient use of the ICS 105 IC scanner. It must be kept with the scanner at all times so that it is easily accessible for the user.

2.2 Reading and understanding the user manual

The user must have read and understood the user manual before using the product. Please contact Langer EMV-Technik GmbH if you have any queries and remarks.

2.3 Local safety and accident prevention regulations

The local safety and accident prevention regulations must be observed.

2.4 Figures and diagrams

The figures and diagrams in this user manual help the user understand the system, but they may also differ slightly from the actual design.

2.5 Limitations of liability

Langer EMV-Technik GmbH can assume no liability for damage to property and personal injury if

- The instructions given in this user manual have been ignored.
- The product was used by persons who are not qualified in the field of EMC and are not fit to work under the influence of disturbance voltages and electromagnetic ESD fields.
- The product was not used for its intended purpose.
- The product was subjected to unauthorised modifications or technical changes.
- Spare parts or accessories were used that had not been approved by Langer EMV-Technik GmbH.




2.6 Errors and omissions

The information in this user manual has been checked very carefully and found to be correct to the best of our knowledge; however, Langer EMV-Technik GmbH can assume no responsibility for spelling, typographical or proofreading errors.

2.7 Copyright

The content of this user manual is protected by copyright and may only be used in connection with the ICS 105 IC scanner. This user manual may not be used for other purposes without the prior consent of Langer EMV-Technik GmbH.

2.8 Description of symbols

Warning signs
 <p>General warning sign</p>
 <p>Warning against dangerous electrical voltage hazard</p>
 <p>Warning against hand injury hazard</p>

3 Scope of Delivery

Item	Name of article	Type	Qty.
1	4-axis positioning system	ICS 105	1
2	Ground plane	GND 25	1
3	ChipScan scanner software	CS-Scanner	1
4	Digital microscope camera	DM-CAM	1
5	Accessories	ICS 105 acc	1
6	User manual	ICS 105 m	1

Important: The scope of delivery may deviate depending on the respective order.

4 Technical Parameters

4.1 General Parameters of the ICS 105 IC Scanner

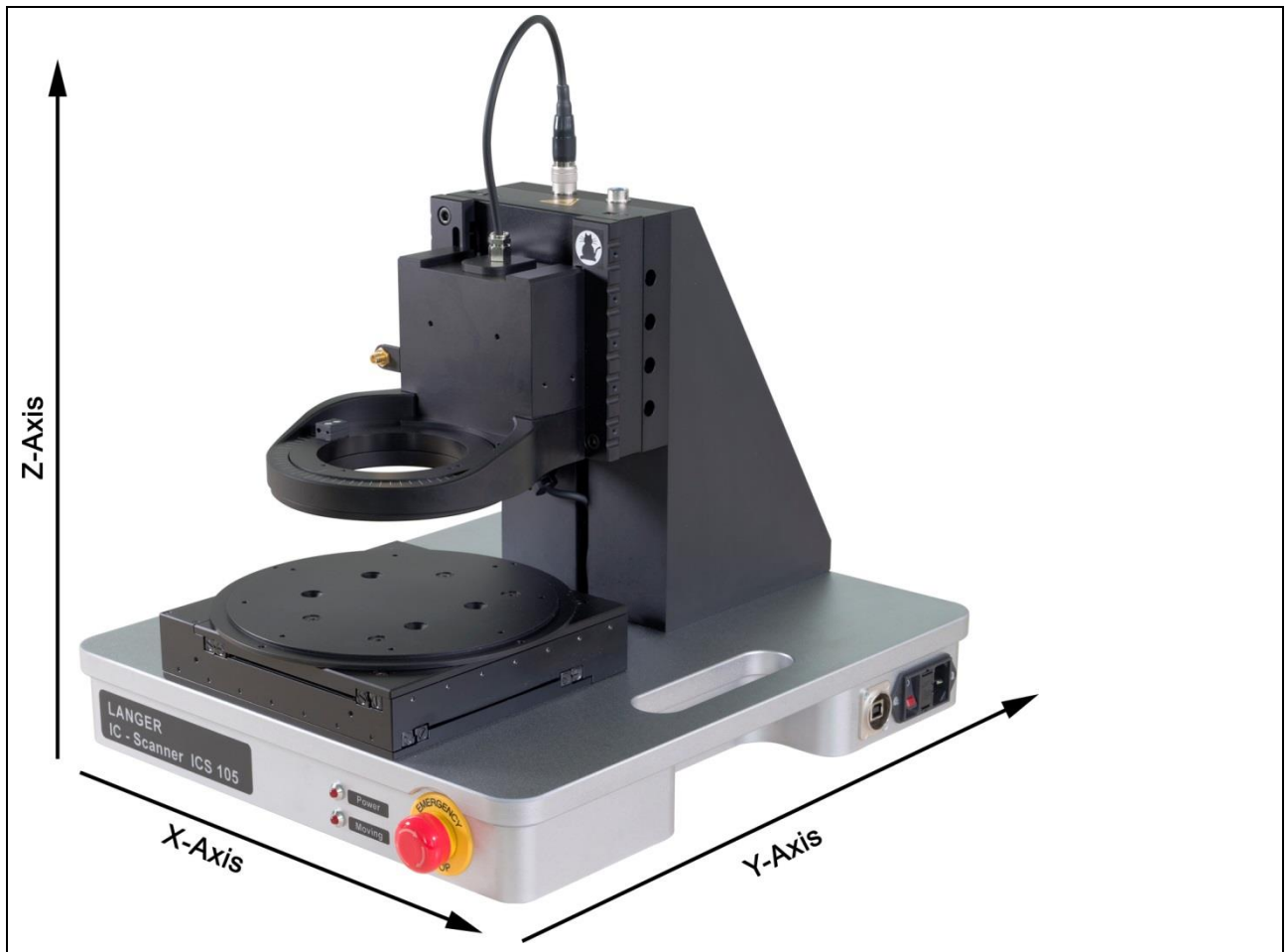


Figure 1: X, Y and Z axis of the ICS 105 IC scanner

Supply voltage	110 / 230 V
PC interface	USB
Max. positioning distance	(50 x 50 x 50) mm α rotation $\pm 180^\circ$
Min. positioning distance	(10 x 10 x 10) μm α rotation 1°
Positioning speed	2 mm/s α rotation 45°/s
Weight	23 kg
Dimensions (L x W x H)	(350 x 400 x 420) mm

Table 1: General technical parameters of the ICS 105 IC scanner

Axes	X	Y	Z	α rotation
Max. positioning distance	50 mm	50 mm	50 mm	+/- 180°
Positioning precision	10 μ m	10 μ m	10 μ m	1°
Repetition precision	+/- 1 μ m	+/- 1 μ m	+/- 1 μ m	+/- 1°
Speeds	2 mm/s	2 mm/s	2 mm/s	45°/s

Table 2: Technical parameters for the four ICS 105 axes

4.2 ChipScan-Scanner Software

4.2.1 System Requirements for CS-Scanner Software

Operating system	Windows 7 64-bit (latest service packs)
Monitor resolution	(1280 x 1024) px
Hard-disk storage	1 GB
Peripheral equipment	CD drive to install the software

Table 3: System prerequisites for the ChipScan-Scanner software

4.2.2 PC Specifications Recommended for use with CS-Scanner

Processor	Intel Core i7 2.7 GHz
RAM memory	8 GB
Graphics card	AMD Radeon 7950
Graphics card memory	3 GB

Table 4: PC specifications recommended for use with the ChipScan-Scanner software

4.3 Technical Parameters of the Subassemblies

4.3.1 GND 25

Diameter	218 mm
Depth of the recess	1.7 mm
Recess dimensions (L x W)	(103 x 103) mm
Weight	2 kg
Height	24 mm

Table 5: Technical parameters of the GND 25 ground plane

4.3.2 UH DUT

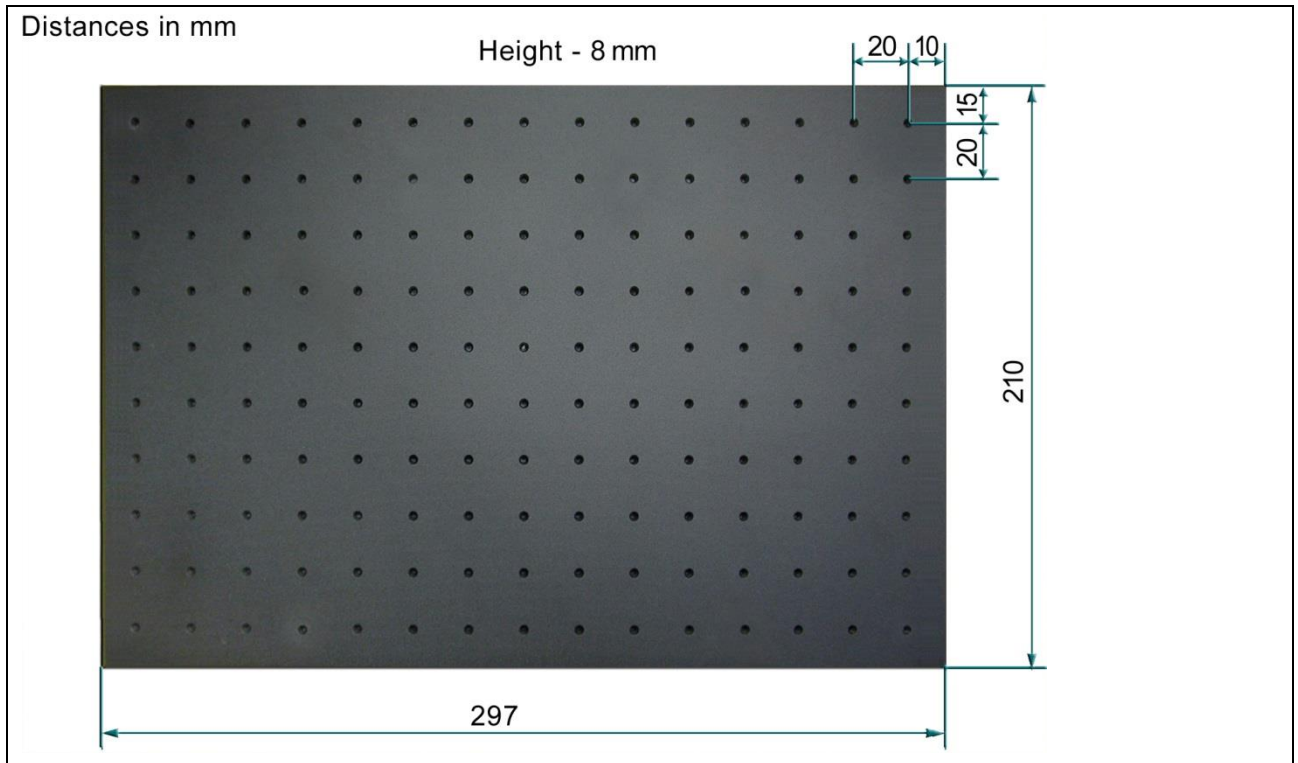


Figure 2: Dimensions of the UH DUT universal holder

4.3.3 Claw 01 and Claw 02

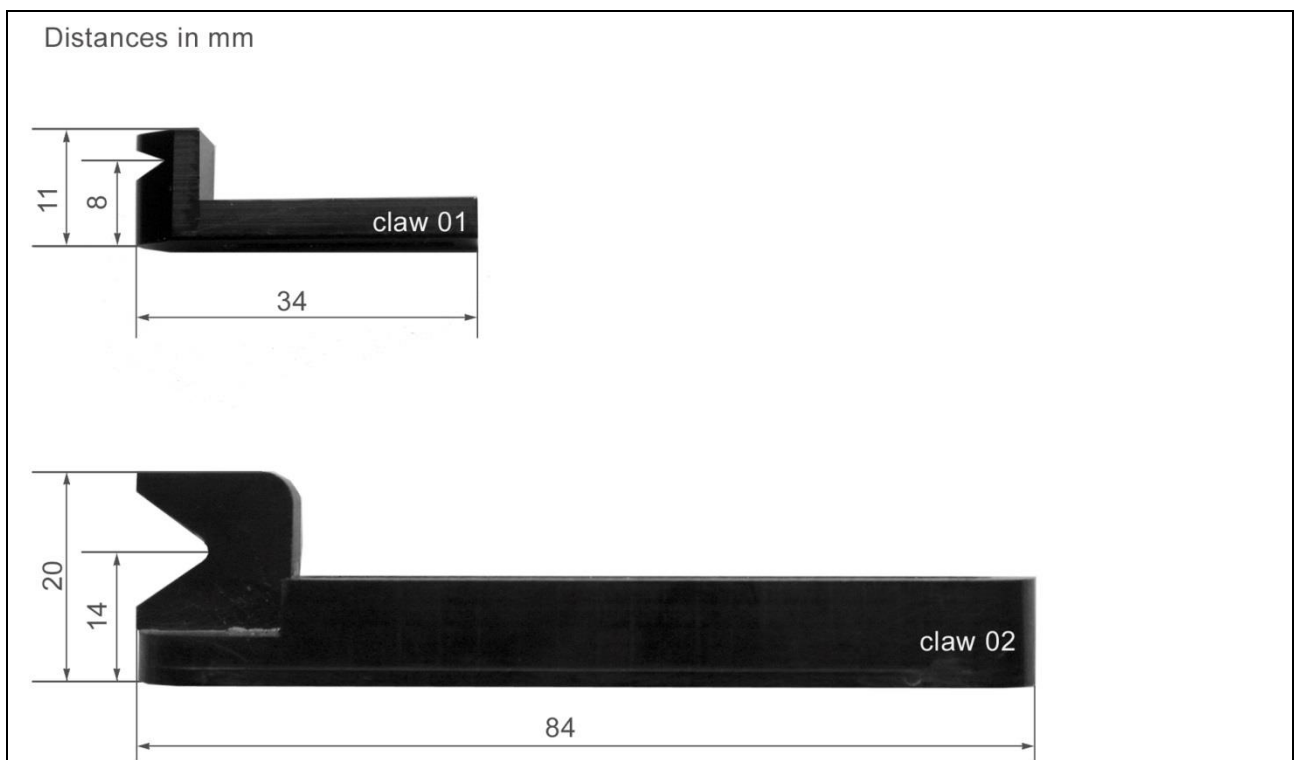


Figure 3: Dimensions of the claws for the UH DUT (claw 01 and claw 02)



Figure 4: Claws from above with the long hole and M3 screw

4.3.4 SH 01 Probe Holder

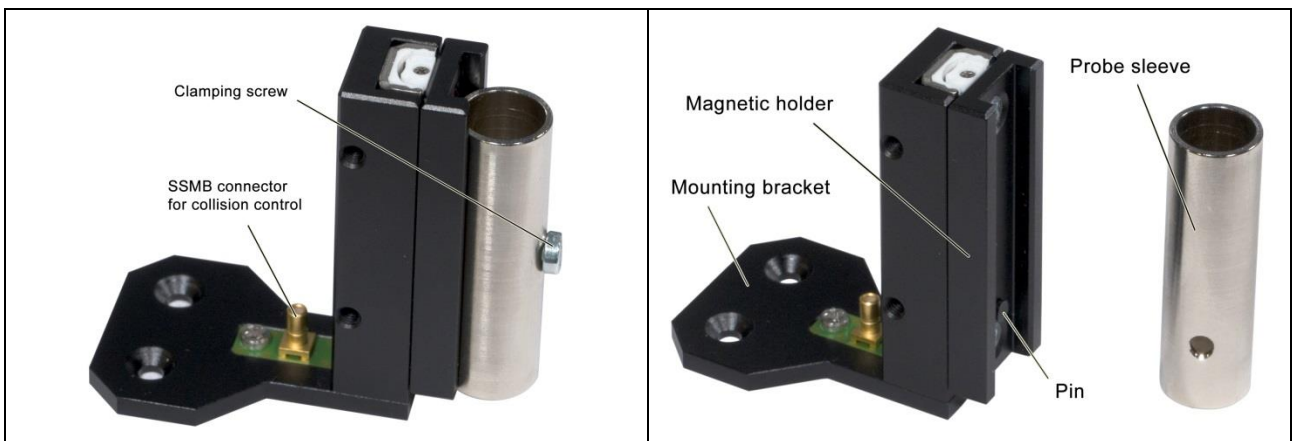


Figure 5: SH 01 probe holder

Probe sleeve	Length: 40 mm
	Inner diameter 9.9 mm
	Outer diameter 12 mm

Table 6: Technical parameters of the probe sleeve

4.4 Ambient Conditions for ICS 105 Operation

Temperature range	10 – 30°C
Maximum humidity	85%

Table 7: Permissible ambient conditions during operation

5 Safety

5.1 Intended Use

The ICS 105 IC scanner is a 4-axis positioning system for probes from Langer EMV-Technik GmbH. It is used to carry out tests and/or measurements on integrated circuits (ICs). Examples of probes that can be used include:

- ICR near-field microprobes
- Passive near-field probes and
- ICI L-EFT sources (IC EM pulse injection)

Fields coupled out by the test IC can be measured or disturbances can be coupled into the test IC depending on the type of probe that is used.

The probes can be moved above the DUT surface on the X, Y and Z axes and rotated on the Z axis. The distance between the probe tip and the test IC can be checked visually with the digital DM-CAM microscope camera at any time. The ICS 105 is controlled with the ChipScan scanner software via a PC. A DLL interface is also available.

The system is used for applications such as:

- Surface scans above the ICs in compliance with the standard DIN IEC/TS 61967-3
- Volume scans above ICs
- Pin scans
- Side channel analysis / Fault injection

5.2 Reasonably Foreseeable Improper Use



Hazard from improper use!

Improper use of the ICS 105 IC scanner may lead to dangerous situations.

Improper use of the ICS 105 IC scanner may put the user at risk, damage the scanner and/or the technical equipment connected to the scanner.

Examples of improper use that may put persons/equipment at risk:

- Safety devices are bypassed or rendered ineffective.
- The ICS 105 IC scanner or any connected devices are used in a defective state.
- The ICS 105 IC scanner is used outside the specified range of technical parameters.
- The field of application is changed by modifications to the design.

Claims due to the improper use of the ICS 105 set are excluded!

5.3 Staff Requirements

Only suitably qualified staff who have the necessary knowledge and experience in the field of EMC may operate the ICS 105 IC scanner.

Persons whose responses are impaired by alcohol, medicines, drugs or similar substances must not be allowed to operate the ICS 105 IC scanner.

5.4 Safety Devices

5.4.1 EMERGENCY STOP Switch

The emergency stop function is triggered by pressing the EMERGENCY STOP switch. The ICS 105 IC scanner is stopped immediately.

After the EMERGENCY STOP switch has been pressed, it has to be released by turning it clockwise before the scanner can be switched back on.

5.4.2 Overcurrent Protective Device

Line-side fuses protect the IC scanner in the event of a fault. The power supply unit is resistant to short circuits.

5.4.3 Switching the Scanner on in Normal Operation and after a Power Failure

The ICS 105 IC scanner can only be activated or operated via the software after passing a self-testing routine.

5.5 Safety Instructions

5.5.1 General Information

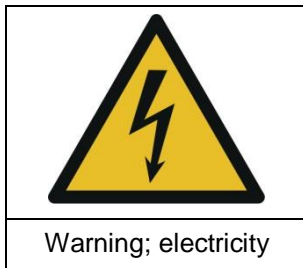
Risks cannot be totally excluded even if the ICS 105 IC scanner is used for its intended purpose.

Observe the safety instructions and hazard warnings listed below to prevent damage to property and personal injury. Also observe the operating and safety instructions for all other devices used in the measurement set-up.

Carry out a visual check before performing a measurement with a product from Langer EMV-Technik GmbH. Replace any damaged connecting cables, attachments and probes. Please contact Langer EMV-Technik GmbH if damaged parts need to be replaced or repaired.

Wear tight-fitting clothes when using the IC scanner.

5.5.2 Hazard due to Electrical Voltage



Hazard from electricity!

Risk of personal injury due to electric shocks!

Always check any attachments, measuring devices, cables and probes before using the IC scanner. Never use any damaged or defective devices.

Do not connect or disconnect any cables whilst the ICS 105 IC scanner is in operation.

Only staff from Langer EMV-Technik GmbH may open the scanner and work on the electrical components and electrical lines.

Switch the device off immediately, disconnect the mains plug and contact Langer EMV-Technik GmbH if you detect any damaged insulation on lines, cables or electric components!

5.5.3 Hazard due to Movements along the Axes



Hazard from axis movements!

Risk of injuries due to crushing!

Keep your limbs away from areas where they can be caught by moving parts.

5.6 Airborne Noise Emission if used for its Intended Purpose

The noise level is below 70 dB(A) if the ICS 105 IC scanner is used for its intended purpose.

No ear protection is required.

6 Overview of the ICS 105 IC Scanner

6.1 ICS 105

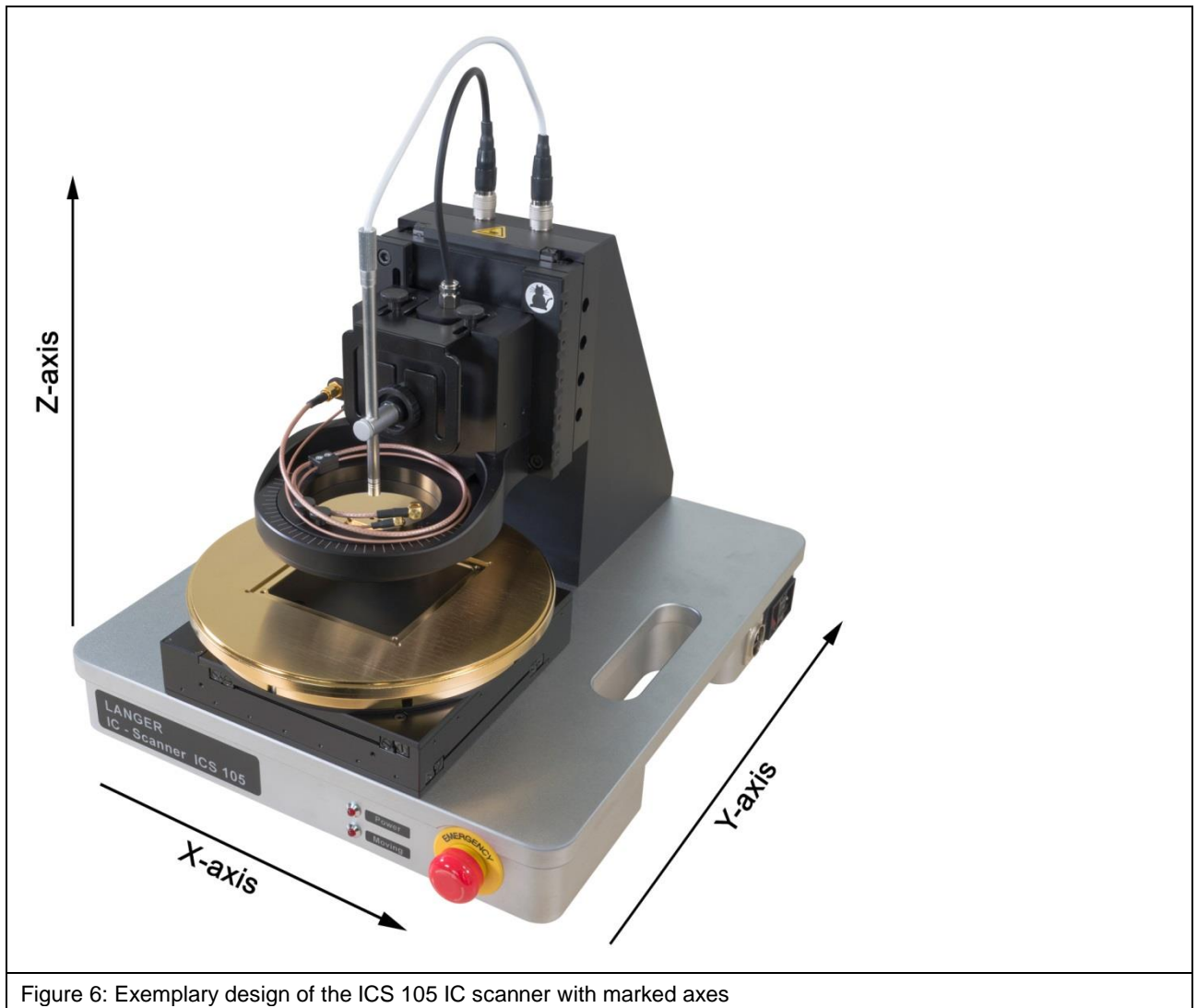


Figure 6: Exemplary design of the ICS 105 IC scanner with marked axes

6.2 Description of the Subassemblies

6.2.1 Rotary Unit

The rotary unit (Figure 7) is used as a fourth axis that allows the installed probe to rotate around the Z axis by $\pm 180^\circ$.

The DM-CAM holder.3 for the digital microscope camera is attached to the rotary unit. Either an ICR probe, ICI source or the SH 01 probe holder can be mounted on the rotary unit's rotary ring.



Figure 7: Rotary unit

The SMA measuring cables are connected to the SMA coupling (Figure 8).
The SSMB-SSMB cable is connected to the SSMB connector (Figure 8) for collision control.

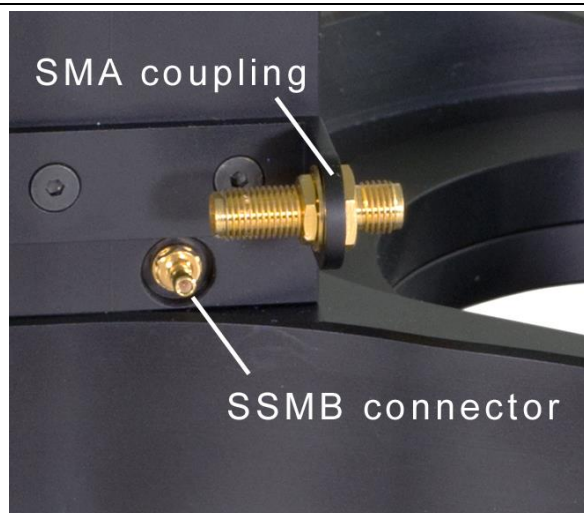


Figure 8: Connectors on the rotary unit

6.2.2 Cross Table

The cross table (Figure 9) is used to position and move the DUTs (devices under test) on the X and Y axis.



Figure 9: Cross table (positioning table)

6.2.3 Z Axis Tower

The Z axis tower (Figure 10) is used to position and move the rotary unit along the Z axis. The rotary unit and the DM-CAM are connected to the tower.



Figure 10: Z axis tower

6.2.4 Scanner Base

The scanner base (Figure 11) provides for stability. The power supply and the PC that is used with the system are connected to the scanner base which also has an EMERGENCY STOP switch and several control LEDs. The integrated handles make it easy to transport the scanner by hand.



Figure 11: Scanner base

6.3 Connectors / Switches

6.3.1 ON / OFF Switch

An ON / OFF toggle switch is located on the right side of the scanner base (Figure 12).



Figure 12: ON / OFF switch

6.3.2 Power Supply

There is an IEC power supply socket alongside the ON / OFF switch on the right side of the scanner base (Figure 13).



Figure 13: IEC power supply socket on the ICS 105

6.3.3 USB Port

USB-type-B port (Figure 14) for the connection between the ICS 105 IC scanner and a computer via a USB cable (type A/B).



Figure 14: USB type B connector to connect a PC

7 Overview of Attachments

7.1 DM-CAM Holder.3

The DM-CAM holder.3 (Figure 15) is used to position and mount the digital DM-CAM microscope camera on the rotary unit.



Figure 15: DM-CAM holder.3

There are three slots that allow an individual installation of the DM-CAM.

7.2 DM-CAM with Camera Screw

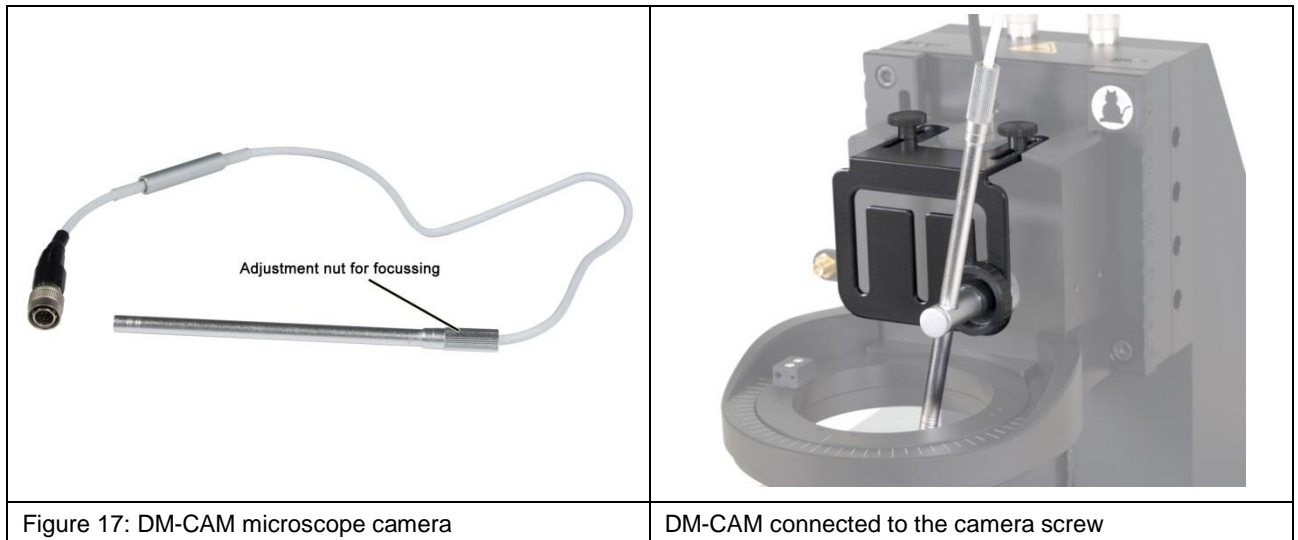
The digital DM-CAM microscope camera (Figure 17) is used to monitor the probe tip position and the distance between the probe tip and DUT.

The camera screw (Figure 16) is needed to mount the DM-CAM on the DM-CAM holder.3.



Figure 16: Camera screw shown separately and as connected to the DM CAM holder.3

The camera can be fixed by sliding it into the opening of the camera screw and tightening the small, silver-coloured knurled screw. The large, silver-coloured knurled screw and the large, black, knurled plastic nut are used to mount the camera screw on the DM-CAM holder.3.



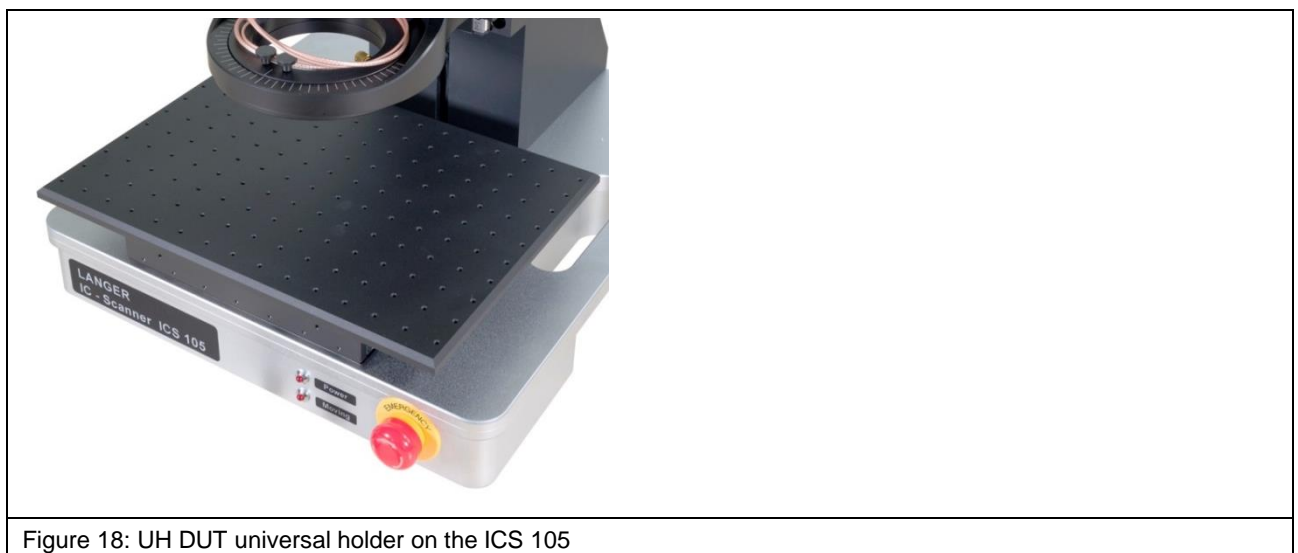
The DM-CAM is connected to the HR10 connector on the IC scanner's Z axis tower.

7.3 UH DUT Universal Holder with Claw 01 and Claw 02

The UH DUT universal holder (Figure 18) is used to fix the DUT. The universal holder is 297 mm long, 210 mm wide and 8 mm high.

The 20 mm x 20 mm grid of M3 threaded holes allows the DUT's individual positioning.

The DUT can be fixed with the respective claw 01 or claw 02. There are two types of claws that can be chosen depending on the DUT's height.



7.4 GND 25 Holder

The GND 25 holder (Figure 19) holds the GND 25 ground plane.

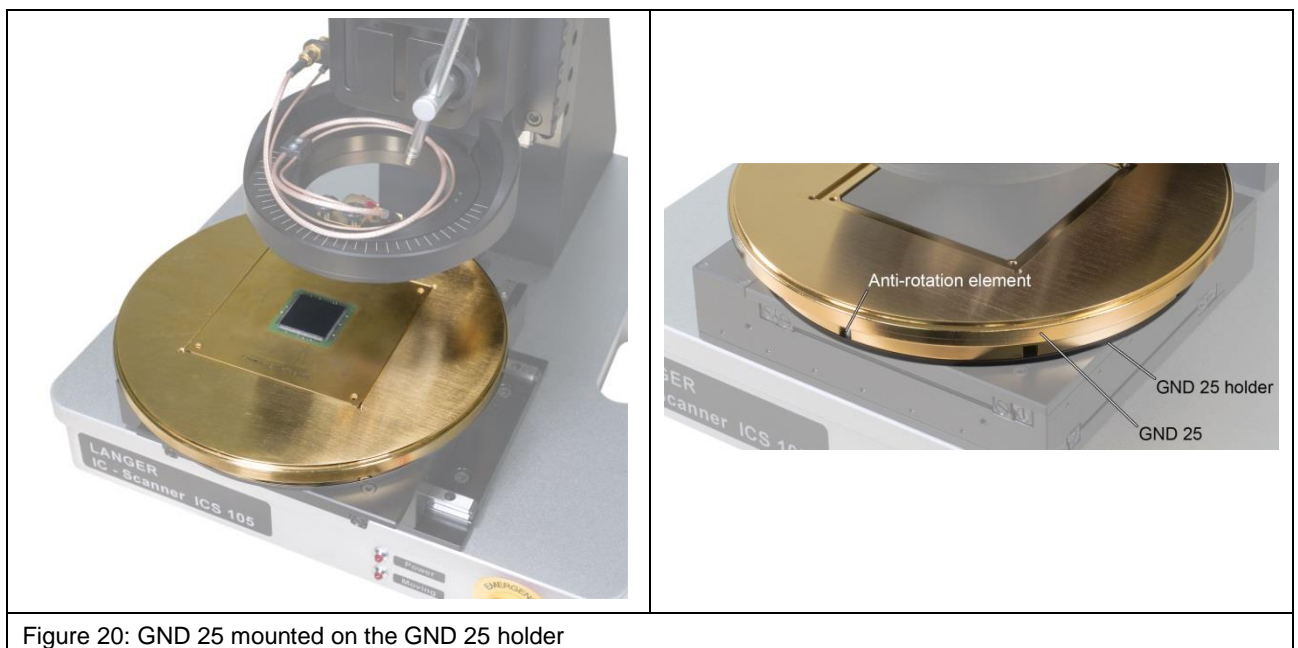
The GND 25 holder is already mounted on the UH DUT universal holder or directly on the cross table depending on the scope of delivery. The GND 25 holder has an anti-rotation element to prevent the GND 25 from turning or slipping.



7.5 GND 25 Ground Plane

The GND 25 ground plane (Figure 20) is installed on the GND 25 holder. The GND 25's recess is 103 mm long and wide.

The recess size allows the GND 25 to hold standardised test circuit boards (100 x 100 TEM cell) or your own test circuit boards. Please refer to Section 19.1 for further information.



7.6 SH 01 Probe Holder

The SH 01 probe holder (Figure 21, Figure 22) is designed to hold a near-field probe. The SH 01 comprises a mounting bracket, the magnetic holder and the probe sleeve.

The probe sleeve is held magnetically and can be loosened quickly and easily to install a probe without any problem, for example.

The probe sleeve has a bore on the rear so that it can be returned into its correct position on the magnetic holder by simply positioning the bore directly above the magnetic holder's pin.

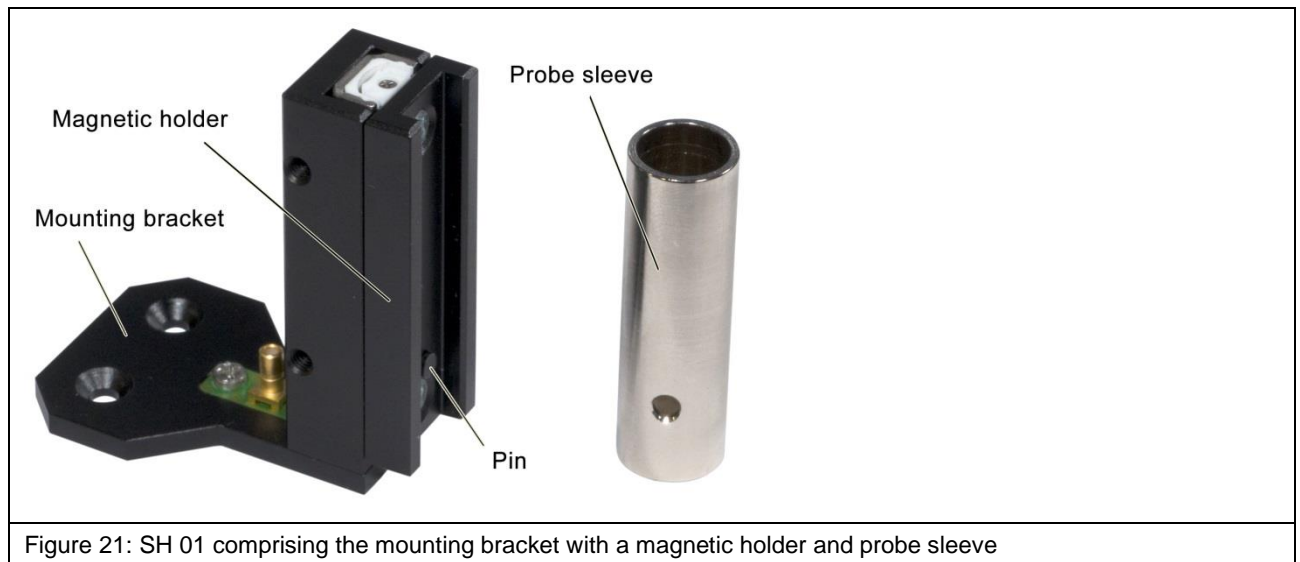


Figure 21: SH 01 comprising the mounting bracket with a magnetic holder and probe sleeve

In addition, the SH 01 has a collision protection function:

- The probe moves up with the magnetic holder if the probe touches an obstacle when moving down. The scanner can recognise this displacement and stop the movement.
- The probe sleeve with the probe is released from the magnetic holder and falls off if the probe hits an obstacle when moving sideways. This normally prevents any damage to the DUT.

Please read chapter 18, item 5, on how to set up the collision protection when the probe is moving down (collision control).



8 Delivery

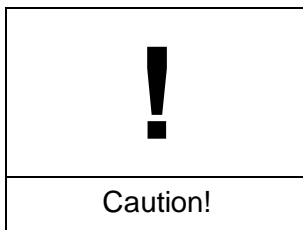
8.1 Transport

The ICS 105 IC scanner is delivered in a transport box. The scanner itself weighs 23 kg. The transport box's dimensions and weight may vary depending on the equipment and place of destination. Therefore, the total weight cannot be provided here.



Hazard from high weight!

Risk of personal injury due to transported goods falling down.



Inappropriate transport may cause damage to property!

Due to its high weight, the transport box should always be transported with a pallet truck or fork-lift truck.

1.1 Acceptance Inspection

The packaging must be inspected for any damage incurred during transport on receipt of the goods. Any visible transport damage should be noted in the forwarder's shipping documents. Please contact the supplier immediately if there are problems in this respect.

→ Defects can only be claimed within the complaints period.

1.2 Storage

Observe the following points when storing the transport box including the scanner, devices and accessories:

- Store in a dry place.
- Only store in closed rooms.
- Store the box on a safe, level surface.
- Store the box on the correct side (do not tilt).
- Do not stack the box on another box and do not stack anything on top of the transport box.

Incorrect storage may damage the ICS 105 IC scanner, devices and/or accessories.

1.3 Opening the Transport Box

Ensure that the transport box is placed on level ground.

When unpacking the box, carry out a thorough check that the consignment is complete on the basis of the scope of delivery and that it has not been damaged during transport.

→ Defects can only be claimed within the complaints period.

1.4 Packaging

The packaging should prevent any damage during transport, corrosion and other damage. Therefore, it should only be removed shortly before the set-up.

We recommend that you keep all of the packaging material in case the product has to be returned.

9 Installation and putting into Service

9.1 Safety Instructions for installing the ICS 105 IC Scanner



Hazard due incorrect installation!

Incorrect installation may cause damage to property and personal injury.

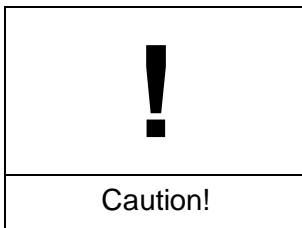
Ensure that there is enough space to install and put into service the ICS 105 IC scanner before starting work.

The work place should be in a closed room with suitable lighting.

The ICS 105 scanner should be installed on a raised surface such as a table, workbench, etc. Check the worktop's size and load capacity before installing the system. The worktop must also be level and firm.

The IC scanner's place of installation and putting into service should be kept clean and tidy.

Secure all individual components so that they cannot fall down.



Damage to property due to inappropriate tightening of screws!

All components for which a special tightening torque is defined have already been installed and tightened. Do not further tighten these screws!

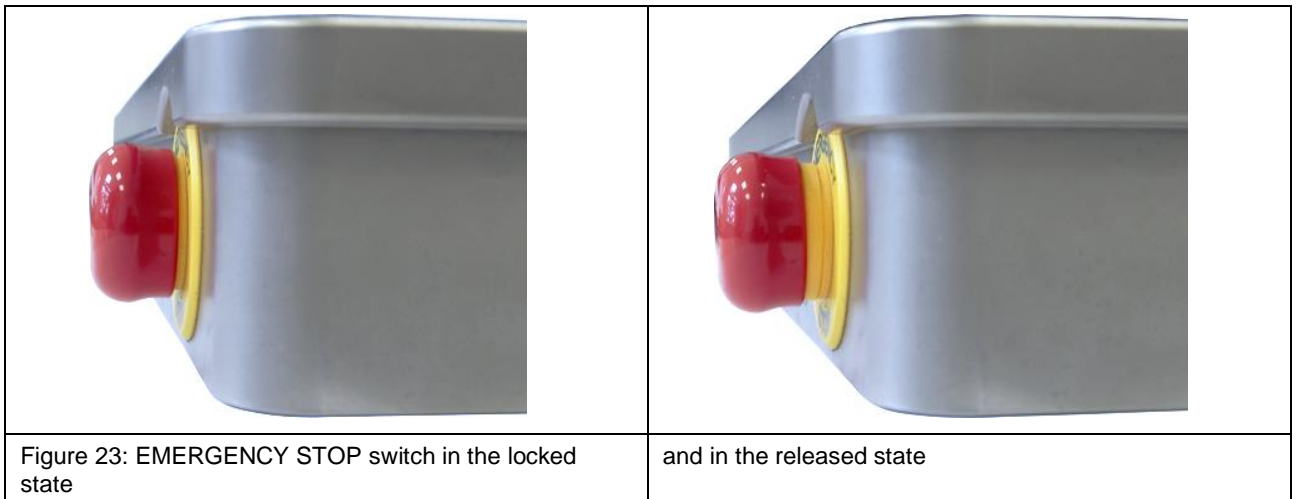
The screws of all attachments that have to be installed later should only be fastened hand-tight. No torque wrench is needed for this purpose.

9.2 Installing the ICS 105 IC Scanner

Set the IC scanner up at its place of installation. Please observe the information in Section 9.1.

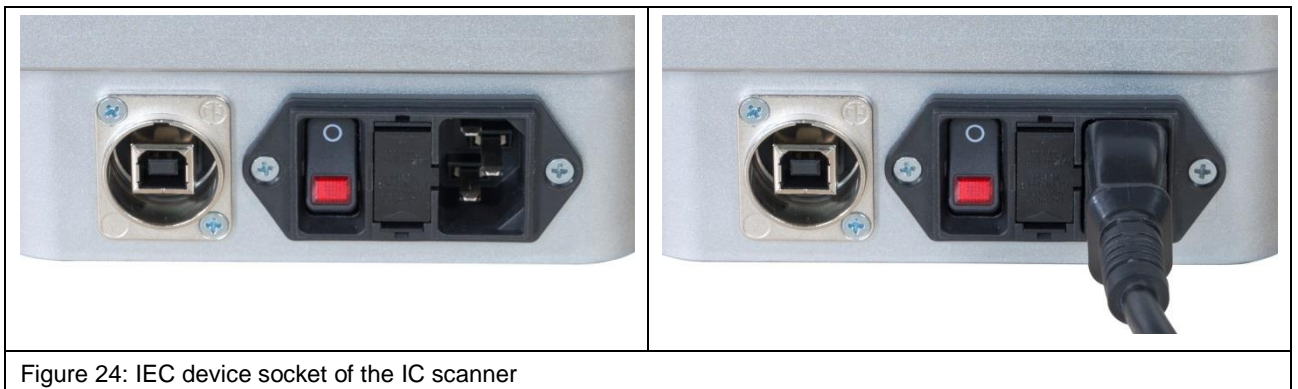
9.3 Checking / releasing the EMERGENCY STOP Pushbutton

Only transport the FLS 105 scanner with the EMERGENCY STOP switch locked in place. If the EMERGENCY STOP switch is locked, the scanner cannot be put into service. Therefore, the user should check whether the EMERGENCY STOP switch is locked before switching the scanner on. If it is locked, turn the EMERGENCY STOP switch in the direction of the printed arrows until it is released (see Figure 23).



9.4 Connecting the IEC Device Lead

Connect the power supply via the enclosed IEC device lead (Figure 24).



9.5 Putting the ICS 105 IC Scanner into Service for the first Time

Read chapter 9.1 before putting the system into service for the first time.

Standard procedure:

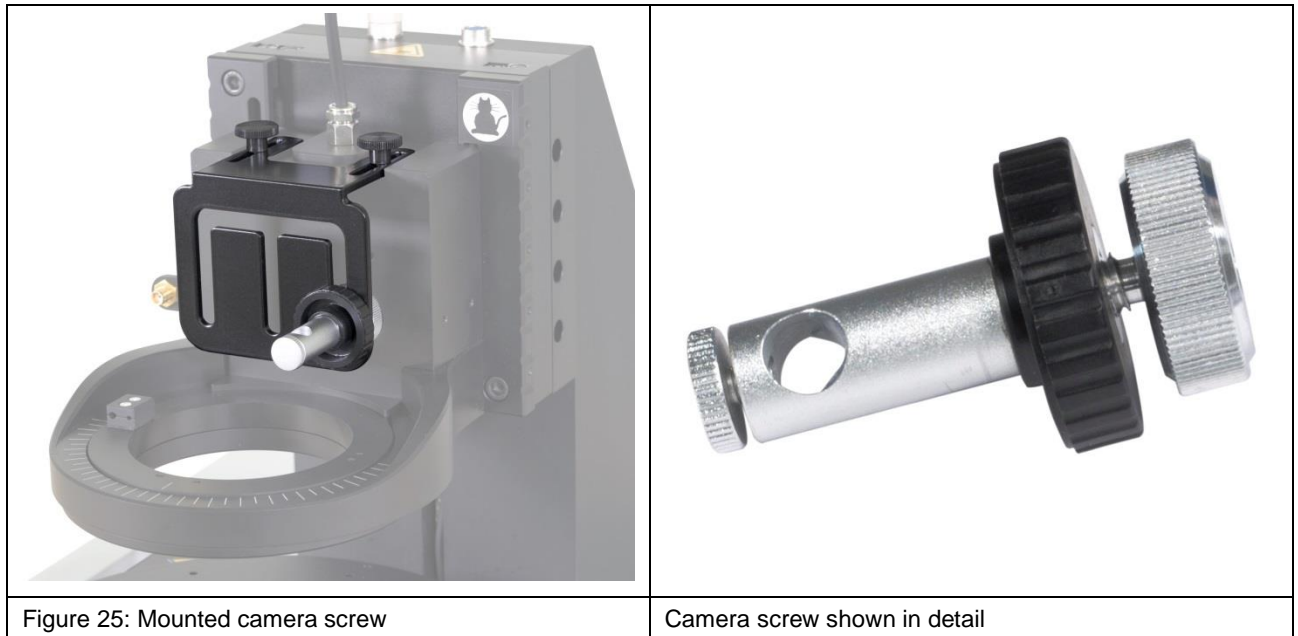
- a) Install and connect the digital microscope camera (Section 10.1).
- b) Check that the cable of the rotary unit is connected correctly (connect if necessary) (Section 6.2.3).
- c) Connect the mains cable (Section 9.4).
- d) Check the EMERGENCY STOP switch and release if necessary (Section 9.3).
- e) Connect the measuring device to the SMA connector on the control panel (please refer to the list of measuring devices supported by the CS-Scanner software) ¹.
- f) Connect the scanner to the PC via a USB type A/B cable (Chapter 11).
- g) Switch on and boot the PC.
- h) Switch on the scanner and install the driver on the PC (Section 17.2).
- i) Install the ChipScan-Scanner software on the PC (Section 17.3).
- j) Start the ChipScan-Scanner software and detect the devices that are connected (Chapter 18).
- k) Calibrate and test the scanner via the ChipScan-Scanner software (Chapter 18, item 3).

¹ www.langer-emv.com/de/product/software/25/cs-scanner-software-chipscan-scanner-usb/145

10 Installing the Attachments

10.1 Installing the digital DM-CAM Microscope Camera

Remove the large, silver-coloured knurled screw from the camera screw, insert it into the opening of the DM-CAM holder.3 from the rear and screw to the black knurled plastic nut (Figure 25).



Insert the digital microscope camera into the opening of the camera screw and fix it in the desired place with the small, silver-coloured knurled screw. The microscope camera can be installed before or after mounting the DM-CAM holder.3.

Then connect the DM-CAM cable to the blue HR10 connector (12-pin) on the Z axis tower (Figure 26).



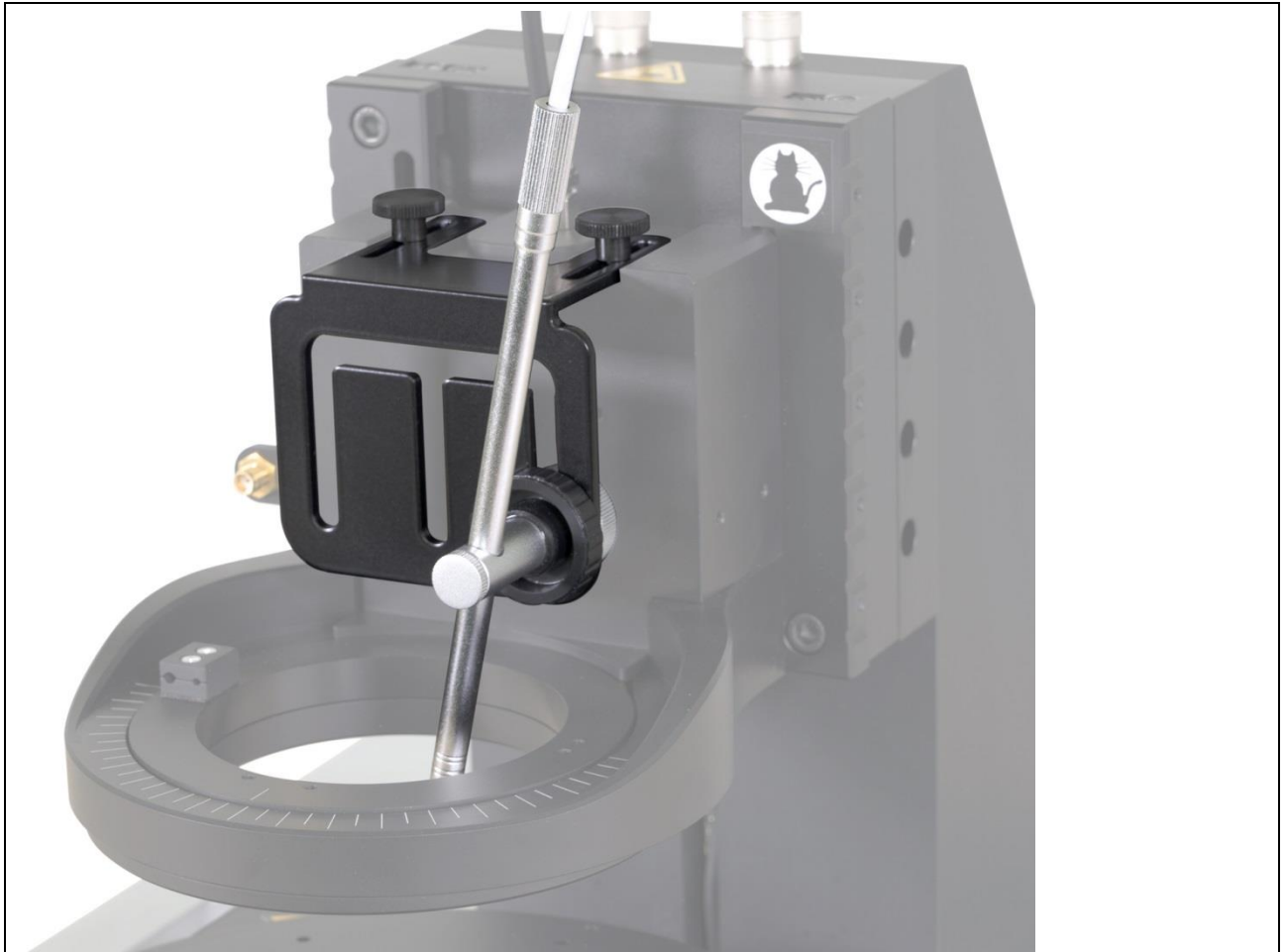


Figure 27: Digital DM CAM microscope camera installed and connected to the Z axis tower via a cable

10.2 Installing the GND 25 Ground Plane

Place the GND 25 ground plane (Figure 29) on the GND 25 holder so that the anti-rotation element is located in the desired notch on the lower side of the GND 25. The GND 25 can be quickly rotated by 45° or 90° if necessary by using a different notch.

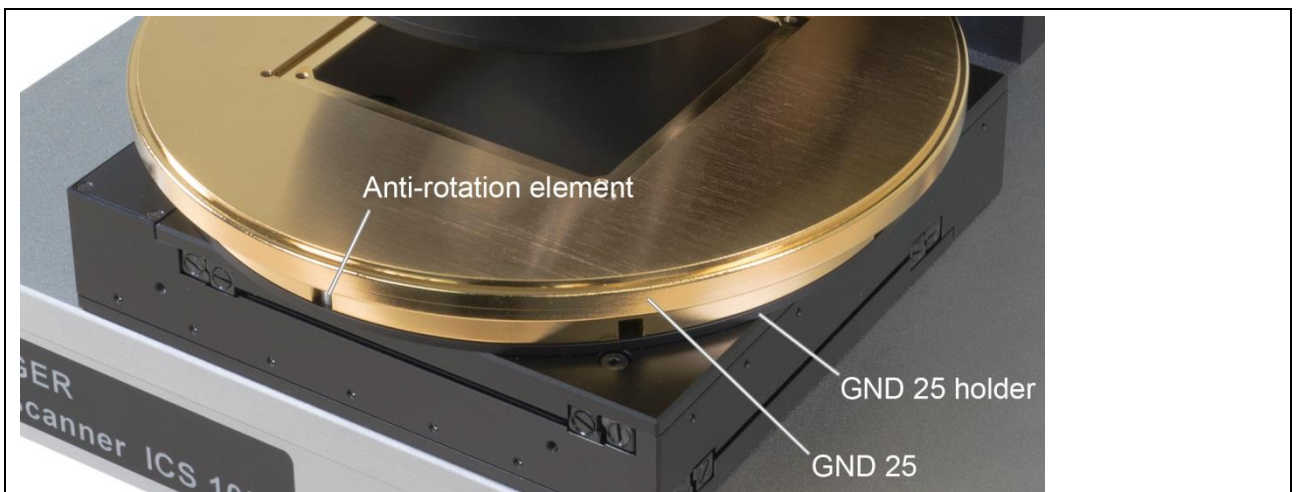


Figure 28: GND 25 on the GND 25 holder with the anti-rotation element visible



Warning!

Danger!

Risk of personal injury if the GND25 ground plane falls down.



Caution!

Risk of damage to property if the GND25 ground plane falls down!

Remember that the GND 25 rests loosely on the GND 25 holder. This means that the installed GND 25 may fall off or down when the IC scanner is transported, for example.

Therefore, always remove the GND 25 before transporting the scanner!

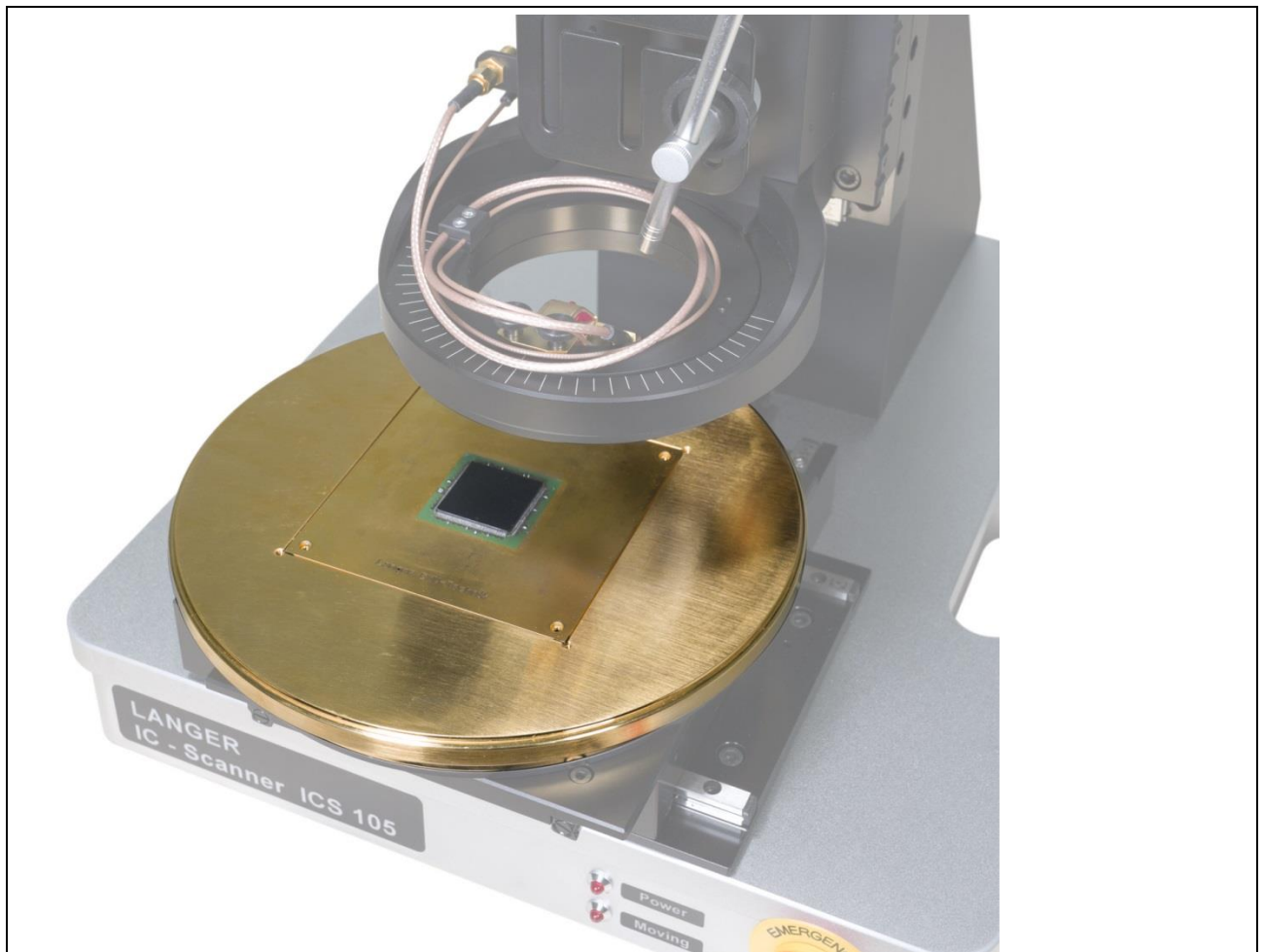


Figure 29: GND 25 ground plane

10.3 Installing the DM-CAM Holder.3 for the Microscope Camera

Mount the DM-CAM holder.3 on the rotary unit with two knurled screws M4 (Figure 30, Figure 31).



Figure 30: Rotary unit without DM CAM holder.3



Figure 31: DM-CAM holder.3 camera holder mounted on the unit

11 Connecting a Computer

Use a USB 2.0 type A/B cable (fully rated, Hi speed, maximum length of 2 meters) to connect the IC scanner to a computer. Connect the USB type A plug to the PC and the USB type B plug to the USB type B port (Figure 32) on the ICS 105 IC scanner.

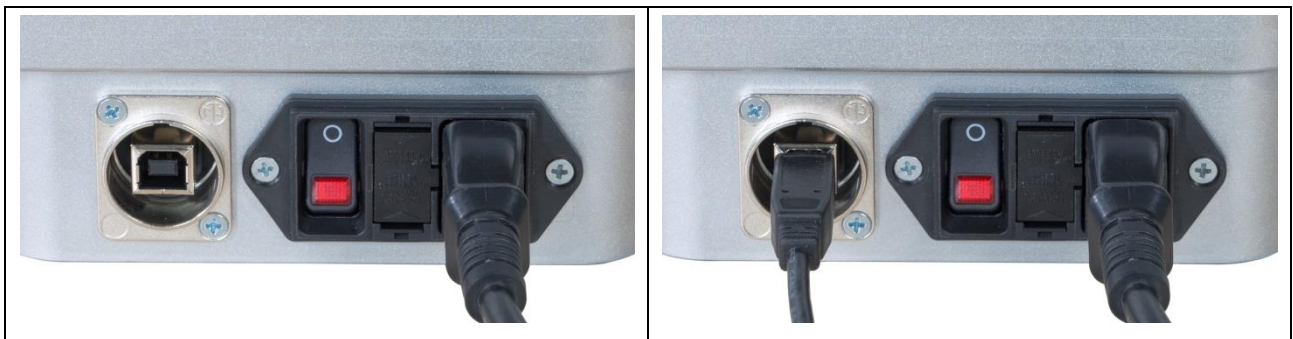


Figure 32: Connection of the USB type B plug to the IC scanner's USB type B connector

12 Connecting a Measuring Device for Near-field Scans taking a Spectrum Analyzer as an Example

To connect a spectrum analyser to the ICS 105 IC scanner, one end of the corresponding measuring cable is connected to the spectrum analyser's RF input and the other end (SMA plug) to the SMA connector on the rotary unit (Figure 33).



Figure 33: Connection of the SMA plug of the measuring cable to the SMA connector on the rotary unit

Please refer to the annex of the ChipScan-Scanner software user manual or the www.langer-emv.de website ² for a list of measuring devices supported by the software.

13 Switching the ICS 105 IC Scanner on

Connect the IEC device cable correctly and bring the toggle switch on the rear of the scanner into the "LED" position to switch the ICS 105 IC scanner on properly (Figure 34).

After switching the ICS 105 on, the LED on the ON / OFF switch and the LED marked "Power" on the scanner base come on.



Figure 34: Switching the IC scanner on

² www.langer-emv.com/fileadmin/ChipScan-ESA%20Supported%20Spectrum%20Analyzers.pdf

14 Installing an ICR Near-field Microprobe

14.1 Safety Instructions for Installing an ICR Near-field microprobe



Caution!

The probe tip of the ICR near-field microprobe is highly sensitive to mechanical stress!

Careless or incorrect handling may cause damage to the probe.

Remove the ICR near-field microprobe's (ICR probe for short) protective cover only after the installation or shortly before the measurement. Do not touch the probe tip. The probe should not be allowed to come into contact with the DUT either!

14.2 Laying the ICR Near-field Microprobe's Connection Cables

Unscrew the two screws of the cable holder on the rotary ring and place the upper part of the cable holder on one side (Figure 35).

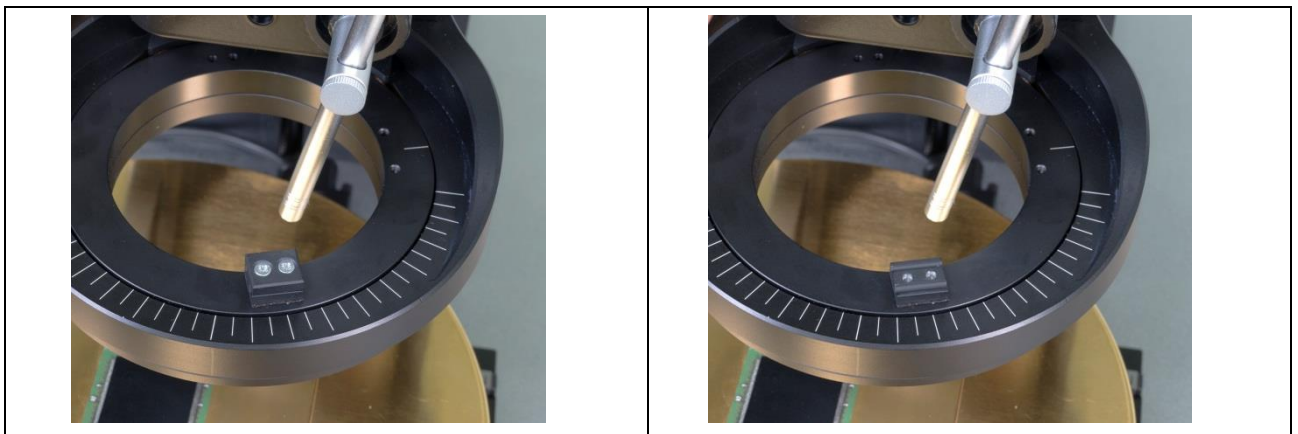


Figure 35: Unscrewing the cable holder

Screw the straight end of the SMA-SMA RA measuring cable to the SMA coupling (Figure 36).

Connect the SSMB-SSMB cable to the SSMB connector on the left side of the rotary unit below the SMA coupling (Figure 37).



Figure 36: Connecting the SSMB-SSMB cable to the SSMB connector on the rotary unit

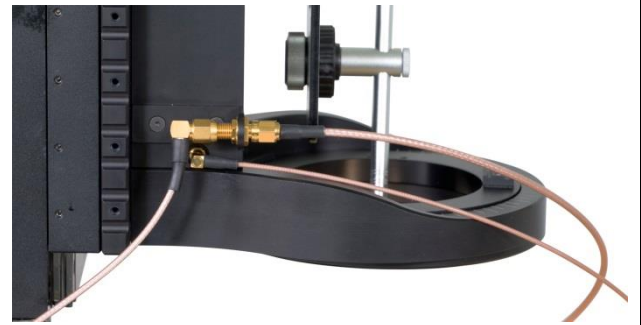


Figure 37: Connecting the SMA-SMA RA measuring cable to the SMA coupling

Place the SMA-SMA RA cable and SSMB-SSMB cable in the open cable holder, attach the upper half of the holder and fasten with screws (Figure 38). Ensure that there is enough space for the cables so as to be able to turn the rotary ring by 180° in both directions.

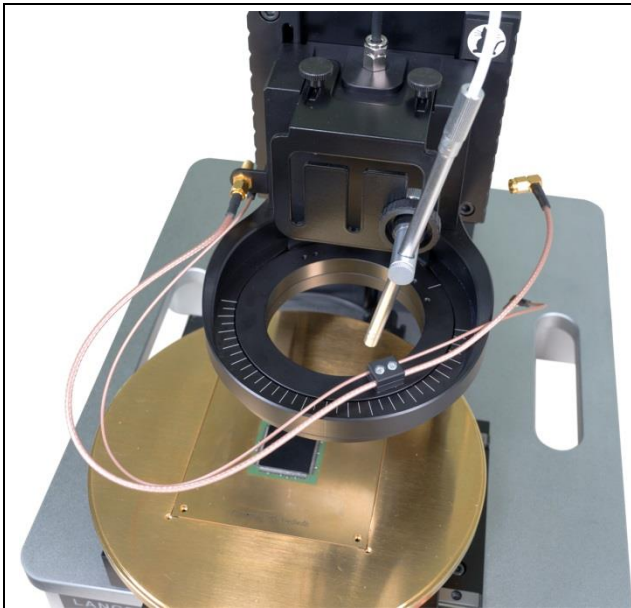


Figure 38: Placing the SMA-SMA RA cable and SSMB-SSMB cable in the cable holder and closing the cable holder

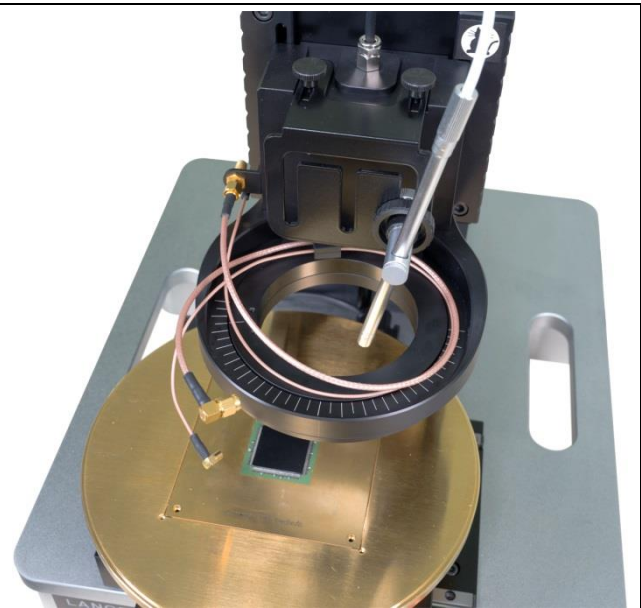


Figure 39: Positioning the rotary ring

14.3 Connecting an ICR Near-field Microprobe

Important note! As a prerequisite for connecting the ICR probe, the cables must have been laid according to Section 14.2.

The ICR probe has to be installed on the rotary ring of the rotary unit. Remove the knurled screws M4 from the rotary ring.

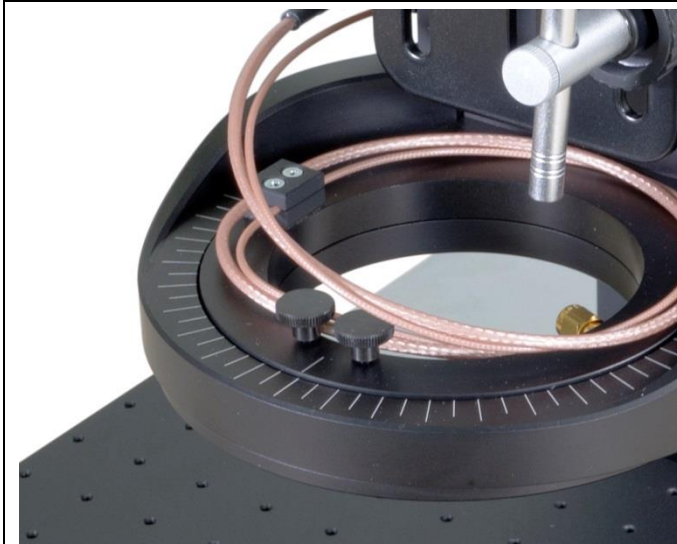


Figure 40: Removing the knurled screws from the rotary ring

We recommend that you first connect the two cables to the ICR probe and then mount the probe on the rotary ring.

Connect the SMA-SMA measuring cable to the "RF out" connector of the ICR probe (Figure 41) and thereafter the SSMB-SSMB cable to the SSMB connector of the ICR probe (Figure 42).



Figure 41: Connecting the SMA-SMA RA measuring cable to the ICR probe

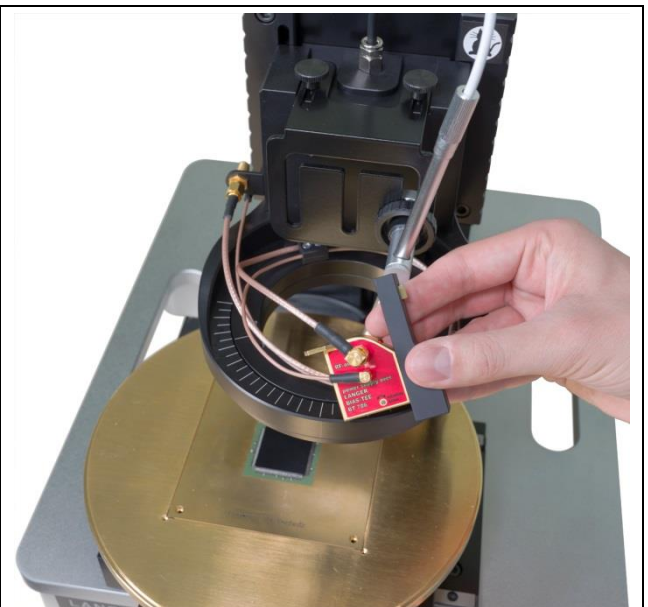


Figure 42: Connecting the SSMB-SSMB cable to the ICR probe

Mount the ICR probe on the rotary unit's rotary ring using the knurled screws M4 (Figure 43).

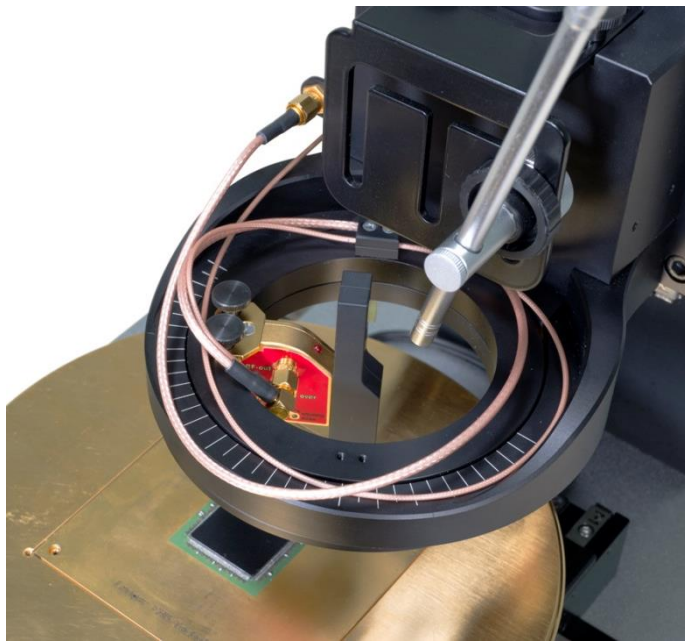


Figure 43: ICR probe mounted with the knurled screws

Note! Remove the protective cap of the ICR probe just before the measurement.

Press the yellow button on the front to release the protective cap and remove it from above (Figure 44).



Figure 44: Protective cap of the ICR near-field probe with lock function

15 Installing a Near-field Probe

Mount the SH 01 probe holder on the rotary unit's rotary ring using the knurled screws M3 (Figure 45, Figure 46).



Figure 45: Placing the SH 01 on the rotary ring

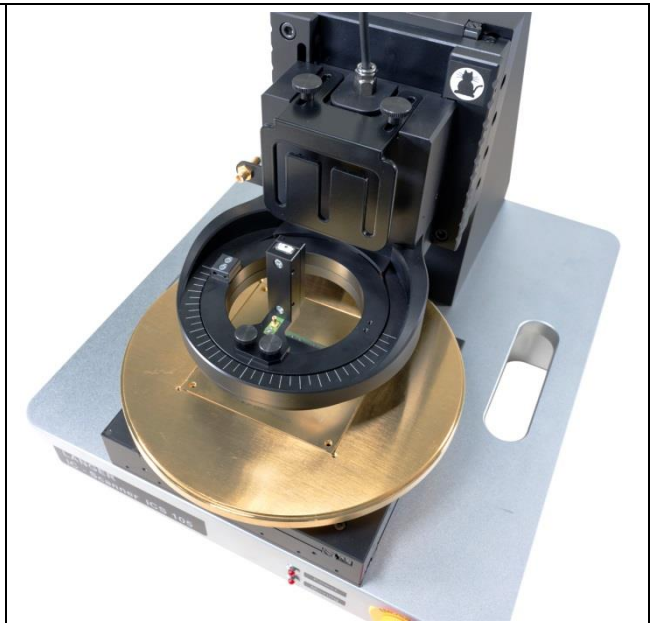


Figure 46: Fixing the SH 01 with knurled screws M3

Connect one end of the SSMB-SSMB cable to the SSMB connector (Figure 47) of the rotary unit and lay the cable on the rotary unit's rotary ring as shown in Figure 48.

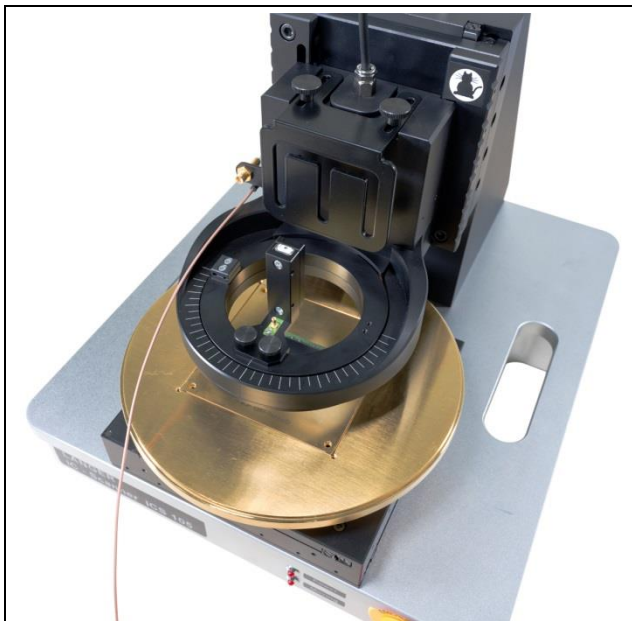


Figure 47: SSMB-SSMB cable connected to the rotary unit's connecting plug for collision control

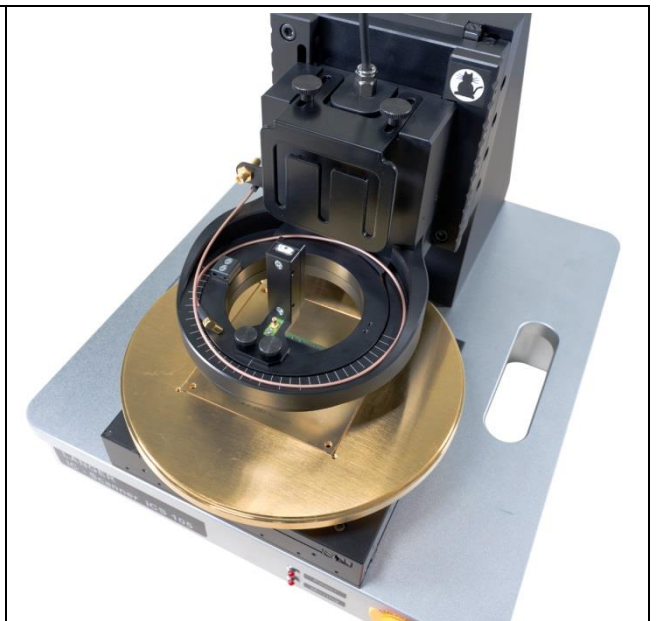


Figure 48: SSMB-SSMB cable laid on the rotary ring

Connect the free end of the SSMB-SSMB cable to the SSMB connector of the SH 01 probe holder (Figure 49).

Screw the straight end of the SMA-SMA RA measuring cable to the SMA coupling (Figure 50).

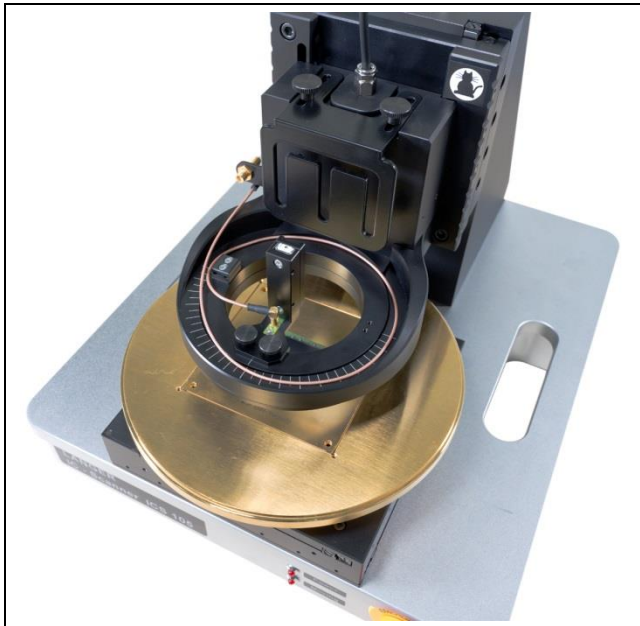


Figure 49: SSMB-SSMB cable connected to the SH 01

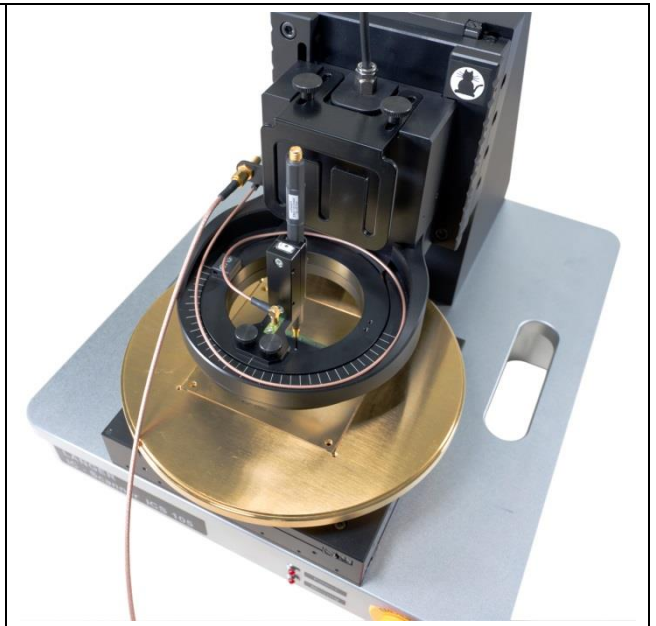


Figure 50: Near-field probe in mounted state and SMA-SMA RA measuring cable connected to the SMA coupling

Insert the near-field probe into the probe sleeve of the probe holder and carefully tighten the small screw on the outside of the probe sleeve by hand (Figure 50).

The probe sleeve can also be removed from the holder as it is held magnetically so as to facilitate assembly (Section 7.6). Thanks to the rear bore, the probe sleeve can be returned to the magnetic holder of the SH 01 and fastened in the correct position.

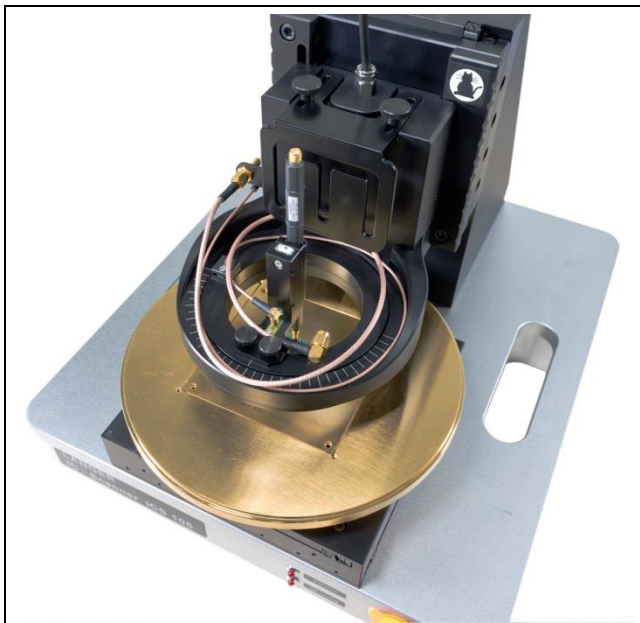


Figure 51: SMA-SMA measuring cable laid on the rotary unit

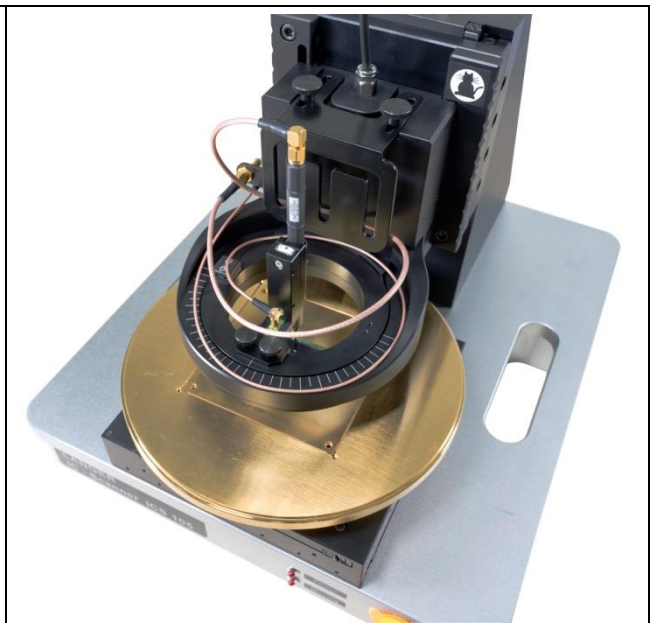


Figure 52: SMA-SMA measuring cable connected to the near-field probe

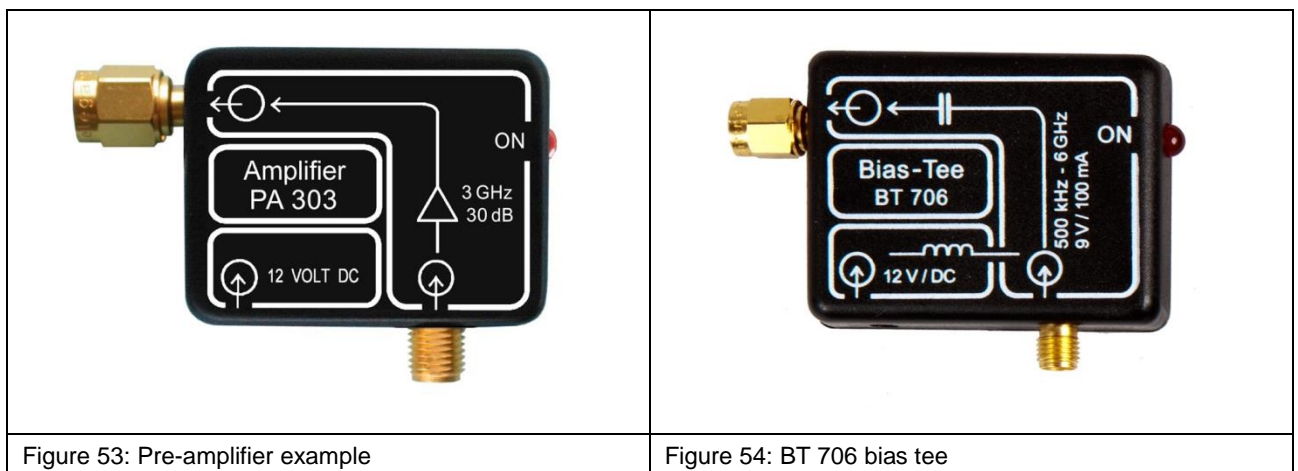
Lay the SMA-SMA RA measuring cable on the rotary ring as shown in Figure 51 and then attach the measuring cable's rectangular SMA plug to the near-field probe (Figure 52).

Important note! Finally check that the installed near-field probe moves smoothly in the Z direction. Carefully pull the near-field probe up by hand and check its smooth motion for this purpose.

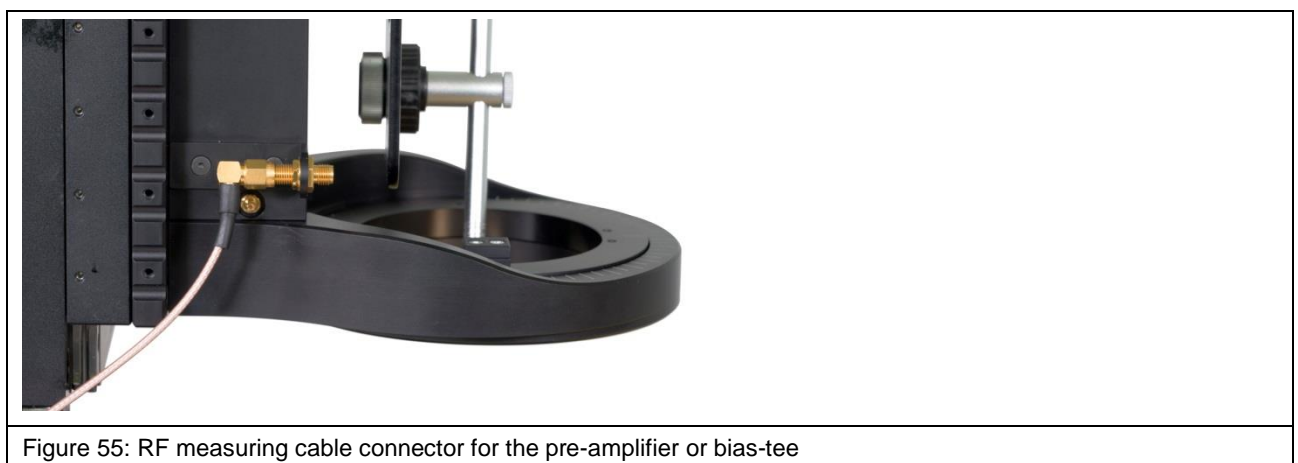
16 Installing the Pre-amplifier / Bias-tee 706

Please note! The pre-amplifier is used for passive near-field probes. The bias-tee 706 is used for ICR near-field microprobes!

A pre-amplifier or the bias-tee 706 can be connected into the signal path between the measuring instrument and the ICS 105, e.g. directly on the measurement input of the spectrum analyser, depending on the probe type.



Connect the pre-amplifier / bias-tee to the SMA coupling on the rotary unit via an RF measuring cable (Figure 55).



The pre-amplifier / bias-tee is powered by the enclosed power supply unit.

17 Software Installation

17.1 Information on how to install the Software

Put the device into service as described in Section 9.5 before installing the software.

17.2 Installing the Scanner Driver

Windows installs the scanner driver automatically when the ICS 105 IC scanner is connected to the respective PC. The driver does not have to be installed by hand.

Process:

- a) Connect the IC scanner to the PC via a USB type A/B cable (Chapter 11).
- b) Switch on and boot the PC.
- c) Switch the IC scanner on (Chapter 13).
- d) Plug in the enclosed USB memory stick.

Then, on the PC:

- 1) Open the Windows system control, search for and open the device manager.
- 2) Double click the "Trinamic Stepper Device" entry under "Other devices" in the device manager.



Figure 56: Device manager with the "Trinamic Stepper Device" entry and a warning sign

- 3) Select the "Driver" tab and click "Update driver..." in the open characteristics window.

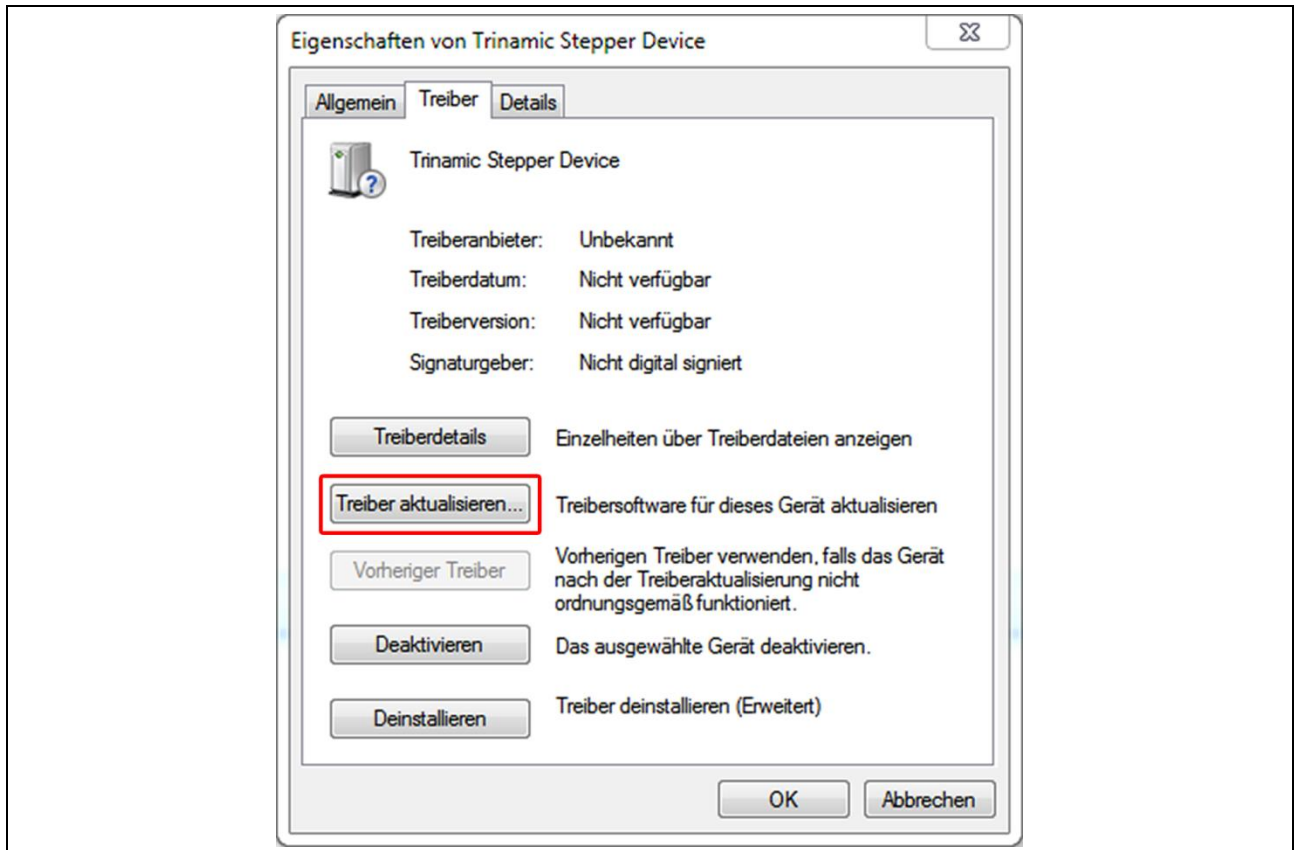


Figure 57: Updating the driver

- 4) Select the "Browse my computer for driver software" option in the dialogue window that opens.

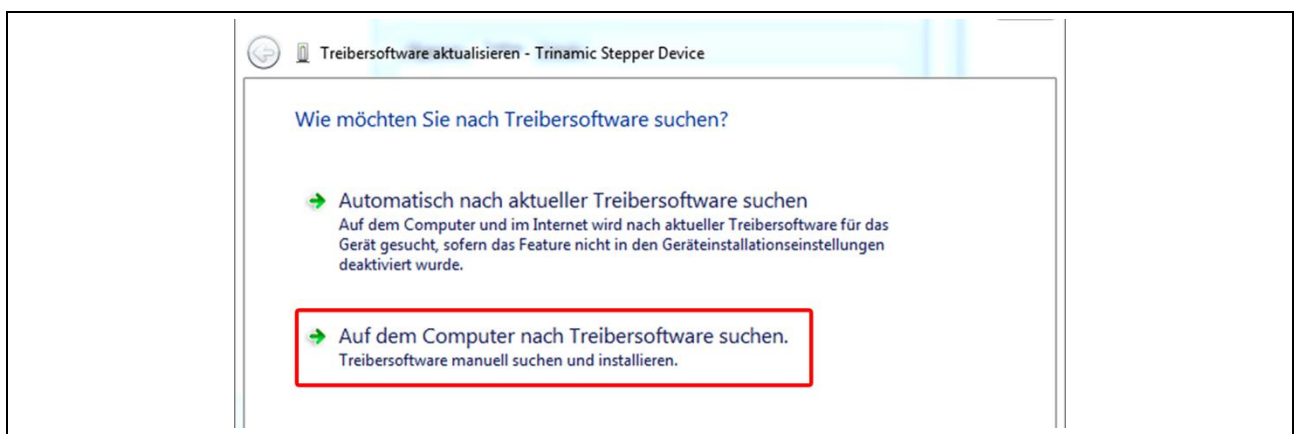


Figure 58: Selection for driver search

- 5) Click the "Browse" button that appears, select the USB memory stick, select the "Driver" sub-folder and click the "OK" button.

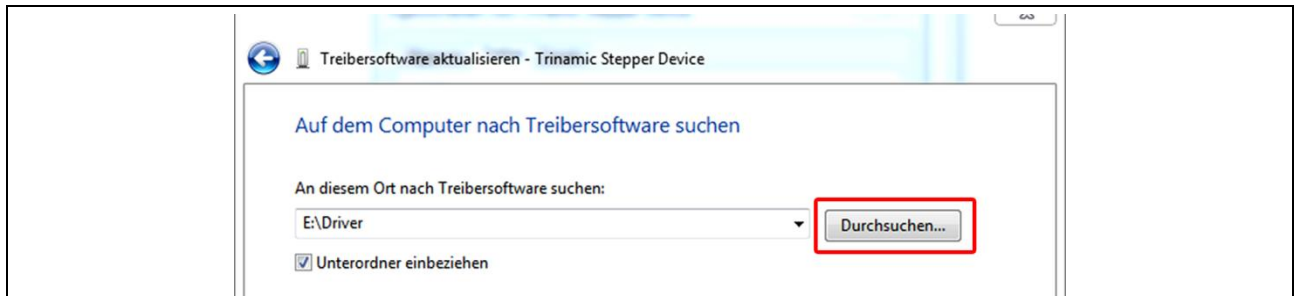


Figure 59: Searching the installation medium for the driver

- 6) The driver will now be installed. The "TRINAMIC Stepper Device" entry should then appear under "Ports" in the device manager.



Figure 60: The scanner driver has been installed (the warning sign has disappeared)

17.3 Installing the ChipScan-Scanner Software

Note! Please refer to Chapter 1 of the software's user manual with the file name "chipscan.pdf" for additional information on installing the ChipScan scanner software. The user manual is in the "Documentation" file on the enclosed USB memory stick.

The installation file is on USB memory stick in the "ChipScan-Scanner" folder.

1. To start the installation process, plug in the USB memory stick, access the "ChipScan-Scanner" folder on the USB memory stick and double click the desired installation file. You can choose between a 32-bit and a 64-bit version.
2. Follow the instructions on the monitor.
3. Complete the installation.

18 Starting the ICS 105 IC Scanner with the ChipScan-Scanner Software

Ensure that the system has been set up as described in Section 9.5 (items a – m) and the scanner driver described in Section 17.2 has been installed.

The ChipScan scanner software user manual with additional information on the individual steps can be accessed if the software is open via the "Manual" entry in the "Help" menu.

The IC scanner and the computer must be switched on and connected via the USB cable.

Carry out the following steps to check whether the ICS 105 IC scanner functions properly:

1. Start the ChipScan scanner software.

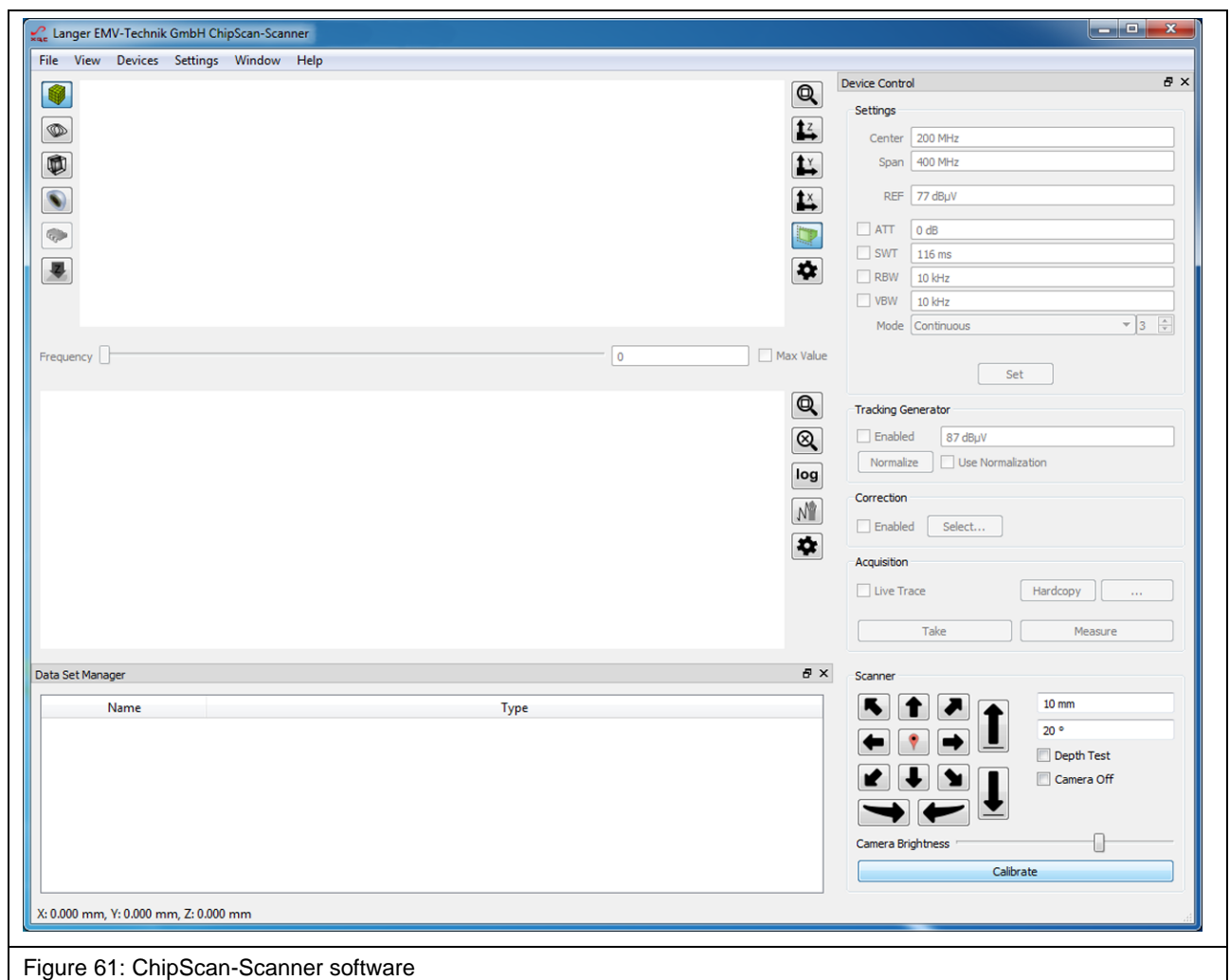


Figure 61: ChipScan-Scanner software

2. Connect the CS-Scanner software to the ICS 105 IC scanner:

- Click the "Device Manager..." entry in the "Devices" menu in the software.
- Click the "Detect Devices" button.
- Searching for the connected devices takes some time. The following entries should then appear in the "Identified devices used for measurement" section:
 - o In the "Video Device" selection box -> *Name of the connected camera.*
 - o In "Scanner" selection box -> *Name of the connected scanner.*
 - o In the "Spectrum Analyzer" selection box -> *Name of the connected spectrum analyzer.*
- Optional steps to speed up the device identification:
In the open "Device Manager" window:
 - o Select the COM interface to which the scanner is connected in the "RS232" selection box in the "Scanner" section.
 - o Select the "Langer ICS 105" entry in the selection box below "RS232".
 - o Then click the "Detect Devices" button.
- After a successful search, close the "Device Manager" by clicking the cross in the upper right corner.
- Please refer to Chapter 4 in the ChipScan-Scanner software user manual for further information.

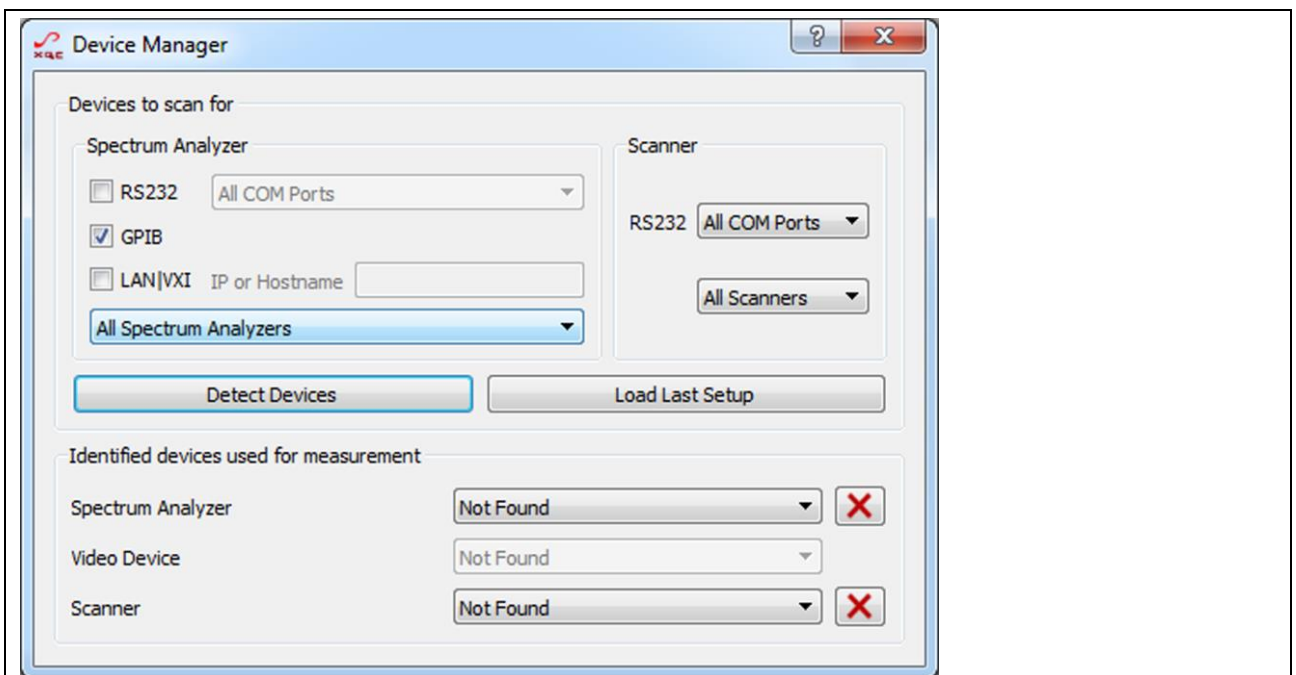


Figure 62: Device Manager

3. Calibrate the ICS 105 IC scanner.

- Click "Calibrate" (lower right corner) to move the IC scanner to its home position. This has to be done every time you start the ChipScan scanner software and every time you switch the IC scanner on or off!
- The IC scanner can then be moved to the desired position with the arrow keys of the directional pad.

4. Open "Video View".

- Click the "Video..." entry in the "Devices" menu to follow the video transmission of the digital microscope camera.
- The desired brightness can be adjusted with the "Camera Brightness" controller in the lower right section above "Calibrate".
- The focus can be adjusted with the adjusting nut (Figure 63) at the rear end of the DM-CAM.

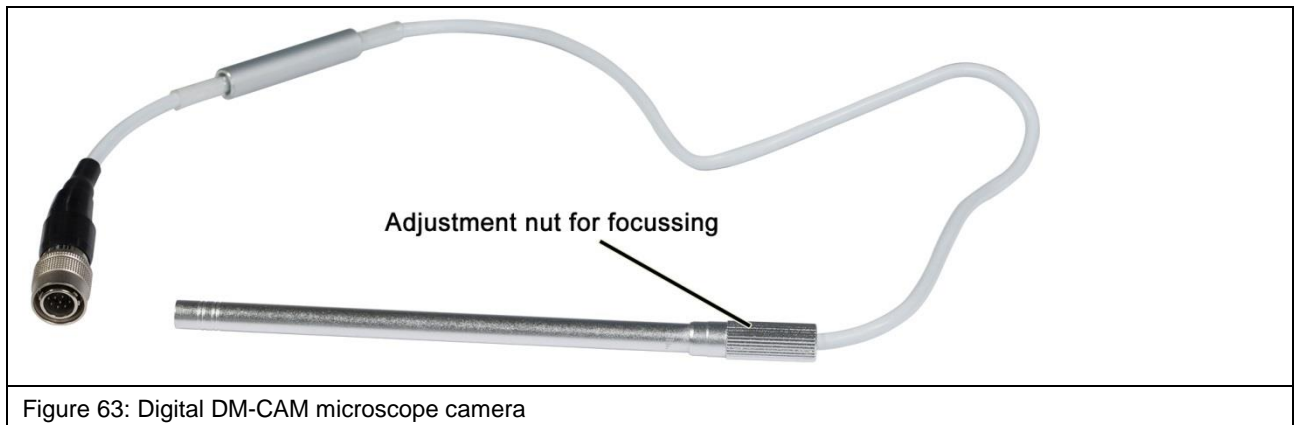


Figure 63: Digital DM-CAM microscope camera

5. Activate the depth test

- Click the "Depth Test" checkbox to activate the depth test for the probe that is connected.
- **Important note!** As a prerequisite, the SSMB-SSMB depth test cable must be connected correctly (refer to Chapter 14, for ICR probes and to Chapter 15 for passive near-field probes).

19 TEM Cells / Test IC

19.1 TEM Cell / Test IC with GND 25

The GND 25 ground plane is designed to hold TEM cell prints with a length and width of 100 mm.

Furthermore, individual test circuit boards may be developed and manufactured for measurements on ICs.

Test circuit boards can either be developed by customers themselves using the "IC test instructions"³ from Langer EMV-Test GmbH or by Langer EMV-Technik GmbH on the basis of the customer's specifications.

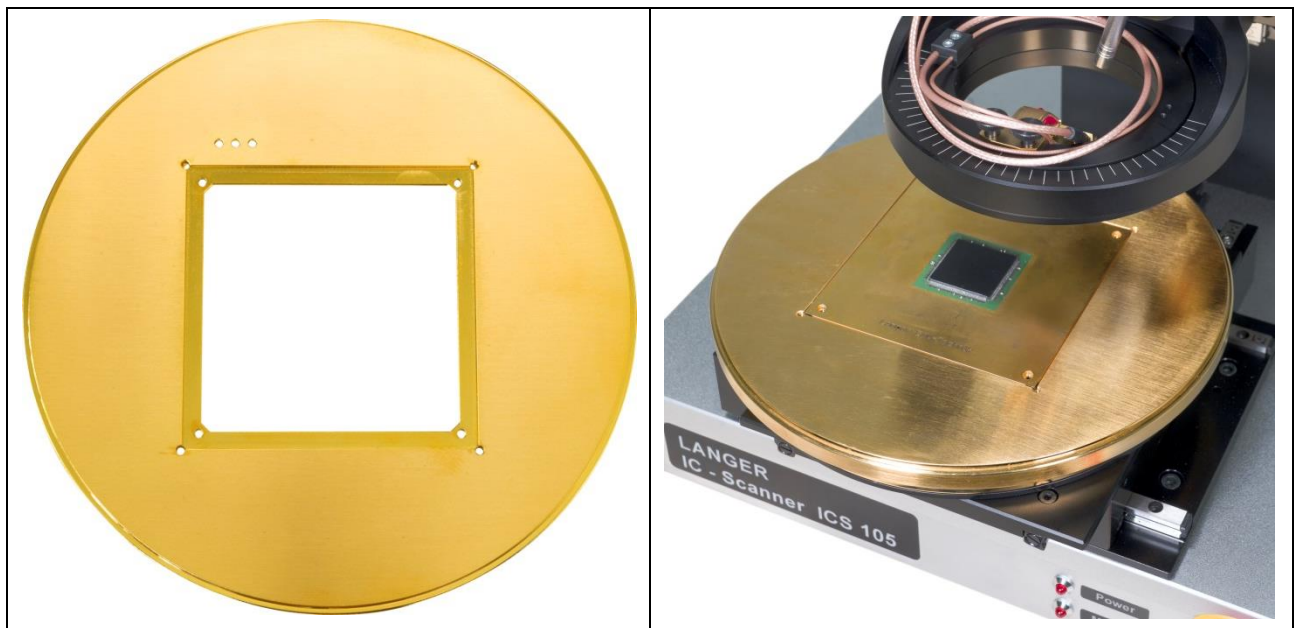


Figure 64: GND 25 ground plane without (left) and with GNDA (right, incl. test IC)

19.2 Test IC on the Circuit Board with UH DUT

Place the circuit board including the test IC in the middle of the UH DUT.

Use either claw 01 or claw 02 depending on the height of the board. Claw 01 is designed to hold a circuit board with a height of less than 8 mm. Claw 02 is designed to hold a circuit board with a height of less than 14 mm.

The claws can be adjusted continuously and have to be fixed with the screws M3 (length of 12 mm, hexagon socket of 2.5 mm) in the holes of the UH DUT.

The circuit board should be fastened with two claws each on two opposite sides (Figure 65).

³ IC test instructions available via mail@langer-emv.de



Figure 65: Fastening example with claw 02

The claws have to be fastened so that the circuit board cannot be moved in any direction. The remaining claws can also be used for this purpose.

20 Information on how to operate the ICS 105 IC Scanner

20.1 Adjusting the exact height of the probe tip above the test IC

In many cases, the distance between the probe tip and the DUT has to be set exactly.

The following instructions will help you make the necessary adjustments:

1. **Act with particular circumspect and care. The probe tips – in particular the tips of ICR probes – are very sensitive and can be easily damaged if the scanner is not adjusted correctly.**
2. Position the probe at a safe height above the desired location.
3. Place the prism (Figure 66) alongside the desired location. The slanted surface of the prism acts as a mirror that allows you to observe the vertical distance between the probe tip and IC surface with the DM-CAM. The DM-CAM has to be adjusted so that the vertical distance between the probe tip and IC can be clearly recognised by means of the prism.
4. Move the probe down in suitable increments until it reaches the desired height. While doing so, always observe the distance between the probe tip and IC with the DM-CAM and readjust the camera's focus as required.
5. The smaller the distance between the probe tip and DUT, the smaller the increment should be. We recommend an increment of no less than 20 µm in the last section.
6. The IC must be aligned parallel to the scanner's T-slot table to prevent the probe tip from touching the DUT's surface during horizontal movements, especially if the distance between the probe tip and IC is very small.
7. We recommend that the probe's further downward movement be blocked once the desired height has been reached. The positioning commands can be deactivated in the ChipScan-Scanner software menu under "Settings" -> "Scanner" -> "Vertical Motion" for this purpose. The arrows that move the probe up or down are then greyed out in the ChipScan scanner software.



Figure 66: Prism to monitor the distance between IC and probe tip

20.2 Estimating the Duration of a Measurement with the ICS 105 IC Scanner

20.2.1 Number of Measuring Points

The duration of a measurement with the scanner increases linearly with the number of the measuring points set.

20.2.2 Travel Distance

The smaller the distance between two neighbouring measuring points, the less time it takes to travel between the measuring points.

20.2.3 Sweep Time

The larger the sweep time of the spectrum analyser, the longer the measurement takes. It should be noted that the sweep time alone is a multiple of the time required for travelling and transmitting the measurement curve. This may take several seconds, especially if the range to be shown is large and the Resolution Bandwidth is small. In addition, the sweep time is multiplied by the value set at "Average Count" if "Average" is used.

20.2.4 Transmission Time

The time for the transmission of a measurement curve from the spectrum analyser to the PC mainly depends on which transmission interface is used. The transmission of a measurement curve with 1,000 measuring points only takes a few milliseconds if a GPIB and VXI is used. In contrast, the transmission takes several seconds if the RS232 interface with a small baud rate is used.

20.3 Storage Requirements for the Measurement

Both the hard-disk storage and the RAM storage must be large enough for storing and showing a scan's measurement results.

The storage requirements depend on the:

- Number of measuring points in the space
- Number of points per trace

Please note that when using Windows as a 32-bit operating system, no more than 2 GB of RAM storage is assigned to the individual programs, such as the CS scanner.

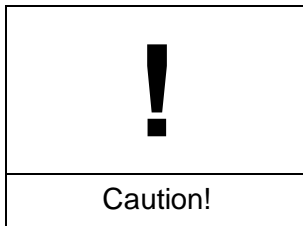
21 After Completing the Measurement

Important note! After completion of the measurement, the rotary unit with the probe installed should be allowed to travel up until it has reached a safe distance to the DUT. If an ICR probe has been used, allow the probe to travel up until the complete protective cap can be put on the ICR probe tip and locked into place.

The scanner can then be switched off properly.

22 Dismantling after Completing the Measurement(s)

22.1 Removing the ICR Probe



Damage to property due to missing ICR probe protection!

Important note! Put the protective cap on the probe tip and lock into place before removing the ICR probe that has been used for the scan from the rotary unit. This largely prevents any damage to the probe tip.

Remove the connected ICR probe from the rotary unit's rotary ring by loosening the knurled screws M3. To do so, hold the probe with one hand and loosen the knurled screws with the other.

Keep hold of the ICR probe, disconnect the SSMB-SSMB depth test cable from the ICR probe's SSMB connector with your free hand and unscrew the SMA-SMA measuring cable from the ICR probe's SMA connector.

You can now put the ICR probe in its case for safe storage.

22.2 Removing the Near-field Probe

Loosen the installed near-field probe together with the probe sleeve from the SH 01 magnetic holder. Then loosen the fastening screw on the probe sleeve and remove the near-field probe from above. Disconnect the measuring cable and put the near-field probe in its case for safe storage.

Return the probe sleeve to the SH 01.

22.3 Removing the SH 01 Probe Holder

First disconnect the connected SSMB-SSMB cable from the SH 01 probe holder. Then remove the SH 01 from the rotary unit by loosening the knurled screws M3. Keep hold of the SH 01 with one hand and loosen the screws with other.

22.4 Removing the Pre-amplifier / BT 706 Bias-tee

First remove the measuring cable from the signal input of the pre-amplifier / bias-tee and the power supply cable from the 12 V input by hand. Then unscrew the pre-amplifier / bias-tee from the "RF in" connector of the measurement device that has been used by hand.

Store the pre-amplifier / bias-tee and the associated cables in the corresponding case.

22.5 Removing a Circuit Board from the UH DUT

After loosening all attached claws (claw 01 and/or claw 02) (screw M3, 2.5 mm hexagon socket), remove the circuit board from the UH DUT universal holder.

22.6 Removing the GND 25

Grasp the edge of the GND 25 ground plane that is installed on the GND 25 holder with both hands and raise it enough to put it in its case for safe storage.

22.7 Removing the DM-CAM Microscope Camera

Disconnect the HR10 plug from the HR10 connector on the IC scanner's Z axis tower. Release the HR10 plug's quick-action coupling to do so.

Then loosen the small, silver-coloured knurled screw on the camera screw and pull the DM-CAM out from above. Put the DM-CAM in its corresponding case for safe storage.

You can also remove the camera screw from the DM-CAM holder.3 camera holder if required. To do so, grasp the black knurled nut with one hand and loosen the large, silver-coloured knurled screw on the rear of the DM-CAM holder.3 with the other.

After removing the camera screw, screw the large, silver-coloured knurled screw back into the black knurled nut and store in a safe place.

22.8 Removing the DM-CAM Holder.3 Camera Holder

You can remove the camera holder by loosening the two knurled screws M4.

23 Maintenance

The ICS 105 IC scanner should be cleaned on the outside at regular intervals. We recommend that a dry, soft cloth be used for this purpose. Use a moist cloth and a neutral cleaning agent to remove heavier soiling.

23.1 Maintenance Intervals

Activity to be carried out	Frequency of the activity
Perform a visual check of the scanner and its attachments.	Before each use.
Clean the scanner surface with a dust cloth.	Monthly (or more often if necessary)
Clean dirty locations with a moist cloth and neutral cleaning agent.	As required

23.2 Replacing Labels and Signs

The marks, labels and safety signs have been permanently affixed to the IC scanner. They must be replaced if they work loose or are no longer legible due to external influences.

Please contact Langer EMV-Technik GmbH in this case (Chapter 26).

24 Dismantling

24.1 General Information

At the end of its service life, the ICS 105 scanner has to be dismantled and disposed of in an environmentally friendly way.

Unless a return and disposal agreement has been concluded with Langer EMV-Technik GmbH, the IC scanner has to be properly dismantled and recycled.

Please note that only qualified electricians may work on electronic components and only qualified specialists may dismantle all other components.

24.2 Information on how to dismantle the ICS 105 IC Scanner



Hazard due to improper dismantling!

Risk of personal injuries if the instructions are ignored!

We thus recommend that

- Chapter 24 must be read carefully before dismantling.
- You ensure that all cables and electronic components are de-energized.
- You ensure that all cables and electronic components remain de-energized.
- That dismantled components be temporarily stored in a safe and tidy manner.
- Langer EMV-Technik GmbH should be contacted in case of queries.

Observe all applicable local and environmental regulations when dismantling the IC scanner.

24.3 Dismantling

Switch the IC scanner off and remove the mains cable before dismantling.

Dismantle the ICS 105 IC scanner with due care and sort its components by their materials.

25 Disposal

25.1 Disposing of the Packaging Material



Risk of damage to the environment due to improper disposal of packaging materials.

Please note that

- Packaging materials may not be disposed of with normal, unsorted household waste.
- Packaging materials have to be recycled.
- Packaging materials have to be disposed of sorted by their materials.

25.2 Disposing of the ICS 105 IC Scanner



Risk of damage to the environment due to improper disposal of the ICS 105 IC scanner.

Please note that

- The IC scanner may not be disposed of with the normal, unsorted household waste.
- The IC scanner must be recycled properly.
- The IC scanner must be disposed of according to the local disposal and environmental regulations.
- The IC scanner must be dismantled before disposal (Chapter 24).
- The dismantled IC scanner components must be sorted by their materials and disposed of accordingly.

26 Customer Service

Please contact us if you have any queries, hints and suggestions.

You can reach us: Monday - Friday 8:00 am to 3:00 pm (CET)

Contact us at: Langer EMV-Technik GmbH
Rosentitzer Straße 73
01728 Bannewitz
Germany

Internet: <https://www.langer-emv.com>

E-mail: mail@langer-emv.de

Phone: +49 (0) 351-430093-0

Fax: +49 (0) 351-430093-22

27 Warranty

Langer EMV-Technik GmbH will remedy any fault due to defective material or defective manufacture during the statutory warranty period either by repair or by delivery of spare parts.

This warranty is only granted on condition that:

- The information and instructions in the user manual have been observed.

The warranty will be forfeited if:

- An unauthorized repair is performed on the product.
- The product is modified.
- The product is not used for its intended purpose.
- The product is opened.

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