

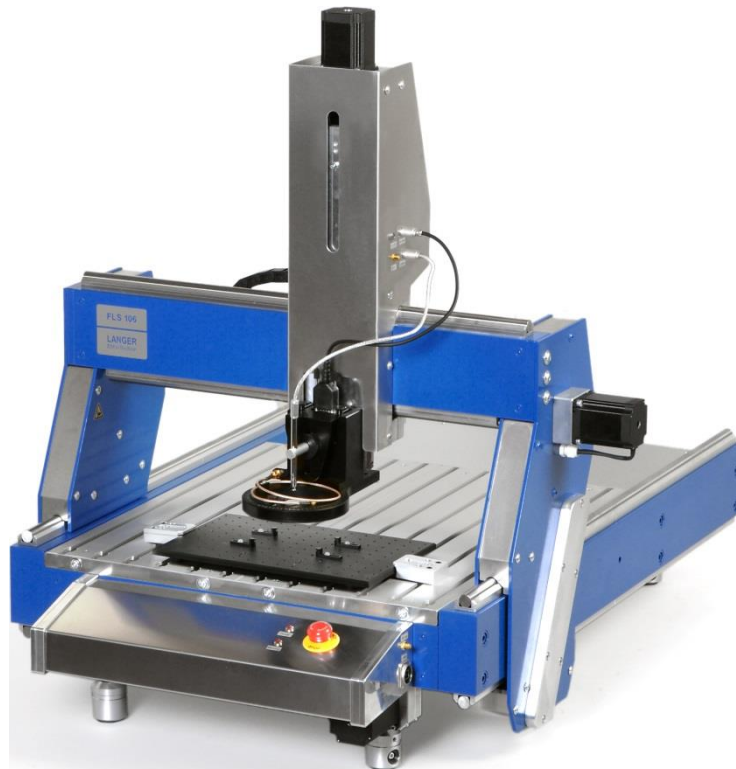
LANGER
EMV-Technik

IC TEST SYSTEM

User manual

FLS 106 IC set / FLS 106 PCB set

IC scanner 4-axis positioning system /
PCB scanner 3-axis positioning system



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- Translation of the original German user manual into English -

2019.08.15 User Manual FLS 106 eng

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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

FLS 106 IC / FLS 106 PCB 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 protection objectives of the Low Voltage Directive 2014/35/EU.

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

- DIN EN ISO 12100:2011 (Safety of Machinery – General Principles for Design – Risk assessment and risk reduction)
- DIN EN 60204-1:2014-10 (Safety of Machinery – Electrical equipment of machines – Part 1: General requirements)
- EN 61000-6-4:2007 (Generic Standards – Emission standard for industrial environments)
- EN 61000-6-2:2006 (Generic Standards – Immunity for industrial environments)

Name of the person authorised to compile the technical file:

Gunter Langer

Bannewitz, 02.04.2019

Signature:



(Signature)

G. Langer, Managing Director

2 General Information

2.1 Storage of the User Manual

This user manual enables the safe and efficient use of the FLS 106 scanner. It must be kept close at hand and accessible to the user.

2.2 Reading and Understanding the User Manual

Read the user manual carefully, observe the safety information (section 5.3) and follow the instructions given in this manual before putting the device into service.

2.3 Local Safety and Accident Prevention Regulations

The local accident prevention and general safety regulations also apply to ensure that the FLS 106 scanner is used for its intended purpose.

2.4 Images

Figures have been included in this user manual to assist the reader's understanding but may differ from the device's actual version.

2.5 Limitation of Liability

In the following cases, Langer EMV-Technik GmbH can assume no liability for damage to property and personal injury if:

- The information given in this user manual has not been observed.
- The FLS 106 scanner was operated by staff not qualified in the field of EMC.
- The FLS 106 scanner was subjected to unauthorised modifications or technical changes.
- The FLS 106 scanner was not used according to its intended purpose.
- Spare parts or accessories were used that had not been approved by Langer EMV-Technik GmbH.

The actual scope of delivery may deviate from the illustrations and texts in this user manual due to the customization of orders or due to technical changes and innovations.




2.6 Errors and Omissions

The information in this manual has been carefully checked and is believed to be accurate; however, the Langer EMV-Technik GmbH assumes no responsibility for any clerical, typographical, or proofreading errors, or omissions.

2.7 Copyright

The content of this user manual is protected by copyright law and may only be used in connection with the FLS 106 scanner. This user manual may not be used for any other purpose without the prior written approval of Langer EMV-Technik GmbH.

2.8 Description of Symbols

Warning signs
 General warning sign
 Warning, Electricity
 Warning, Crushing of hands

3 Scope of Delivery

3.1 FLS 106 IC set Scope of Delivery*

Item	Name of article	Short name	Qty.
1	4-axis positioning system	FLS 106 IC	1
2	ChipScan-Scanner software	CS-Scanner	1
3	Holder for GND 25	GND 25 holder	1
4	Ground plane	GND 25	1
5	Holder for microscope camera	DM-CAM holder.3	1
6	Digital microscope camera	DM-CAM	1
7	Rotary unit	Rotary unit	1
8	EMERGENCY STOP switch, external	NA 5	1
9	User manual	FLS 106 m	1

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

3.2 FLS 106 PCB set Scope of Delivery*

Item	Name of article	Short name	Qty.
1	3-axis positioning system	FLS 106 PCB	1
2	ChipScan-Scanner software	CS-Scanner	1
3	Universal holder for Langer scanner	UH DUT	1
4	Claw	claw 01	4
5	Claw	claw 02	4
6	Digital microscope camera	DM-CAM	1
7	Probe holder for Langer scanner	SH 01	1
8	Camera arm	KA 220	1
9	EMERGENCY STOP switch, external	NA 5	1
10	User manual	FLS 106 m	1

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

4 Technical Parameters

4.1 General Parameters of the FLS 106 Scanner

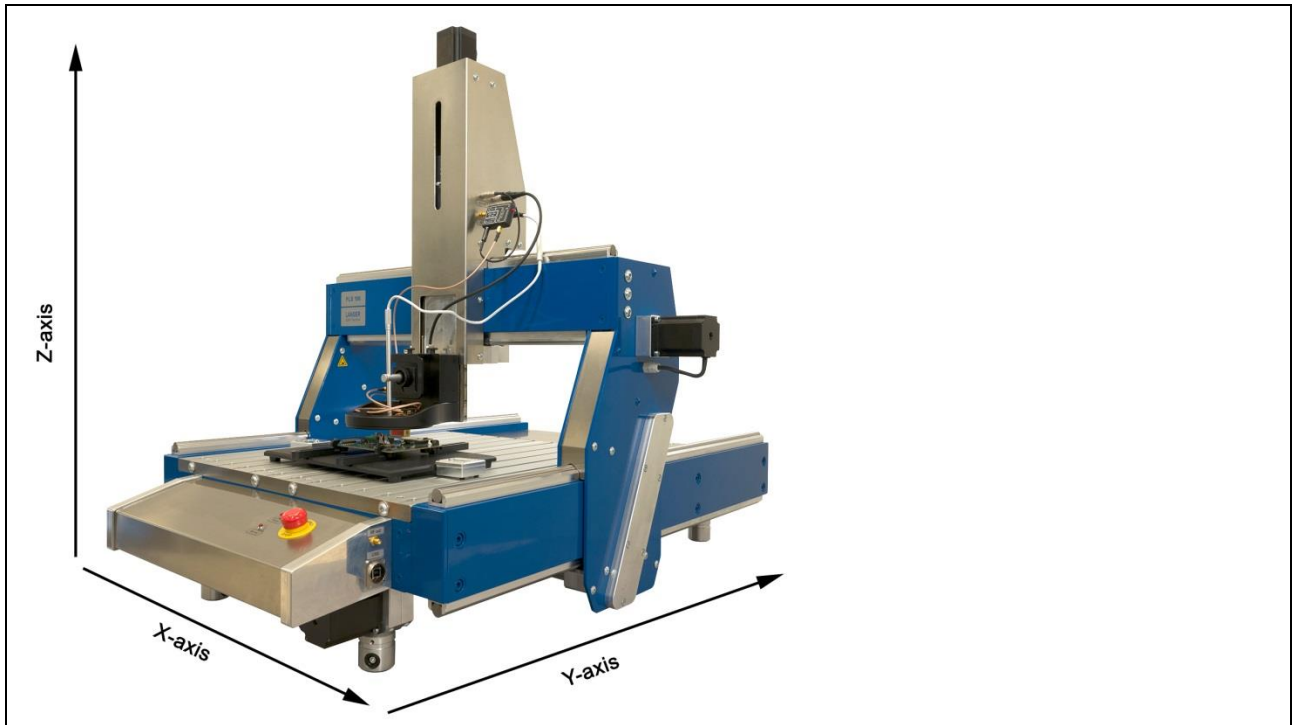


Figure 1: X-, y- and z-axis of the FLS 106 scanner

Supply voltage	100 - 250 V (50/60 Hz)
Current consumption	4.5 A
Interface	USB 2.0 type B (Hi-speed)
Weight	75 kg
Dimensions (L x W x H)	(1030 x 775 x 900) mm

Table 1: General technical parameters of the FLS 106 scanner

Axes	X	Y	Z	α rotation
Max. positioning distance	400 mm	600 mm	120 mm	$\pm 180^\circ$
Min. positioning distance	20 μm	20 μm	20 μm	1°
Positioning speed	20 mm/s	25 mm/s	10 mm/s	90°/s

Table 2: Technical parameters of the x-, y- and z-axis and the rotation axis (only FLS 106 IC)

4.2 Technical Parameters of the Subassemblies

4.2.1 UH DUT

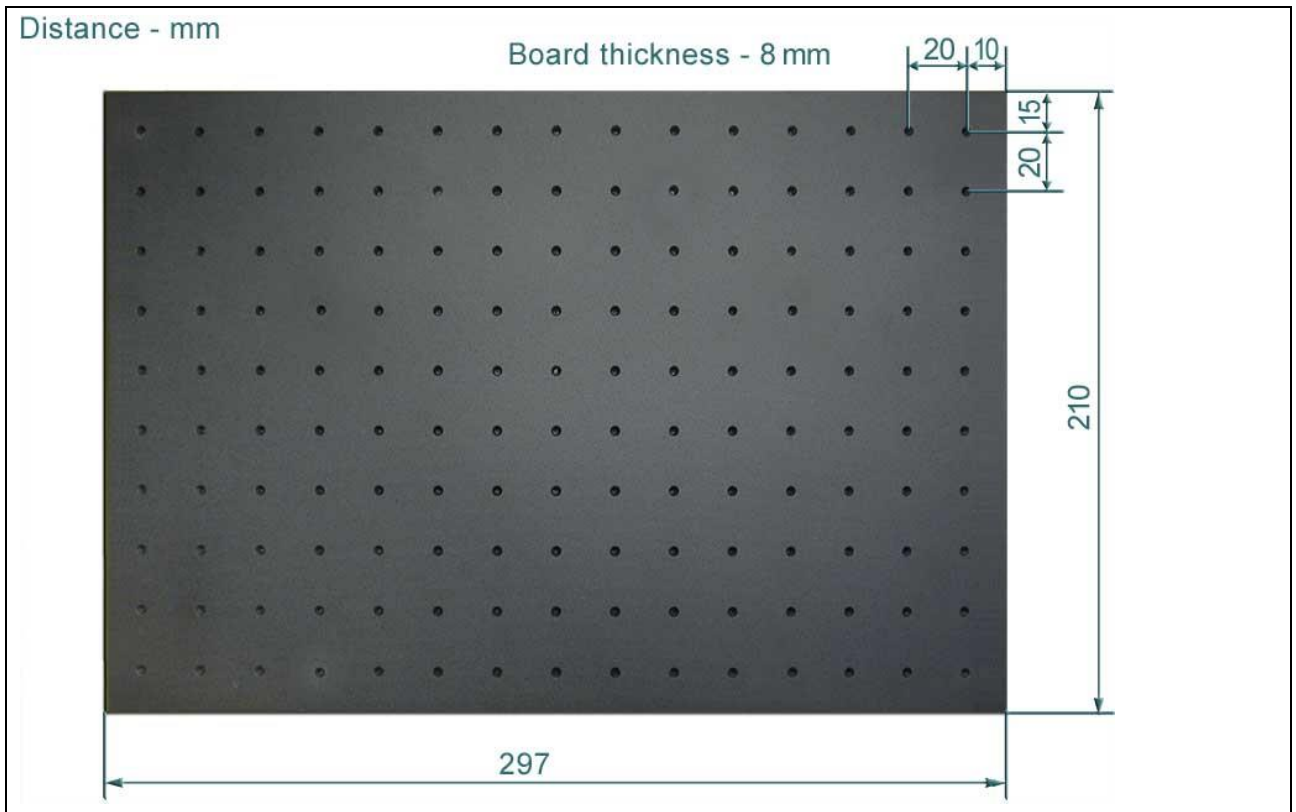


Figure 2: Dimensions of the UH DUT universal holder

4.2.2 Claw 01 and Claw 02

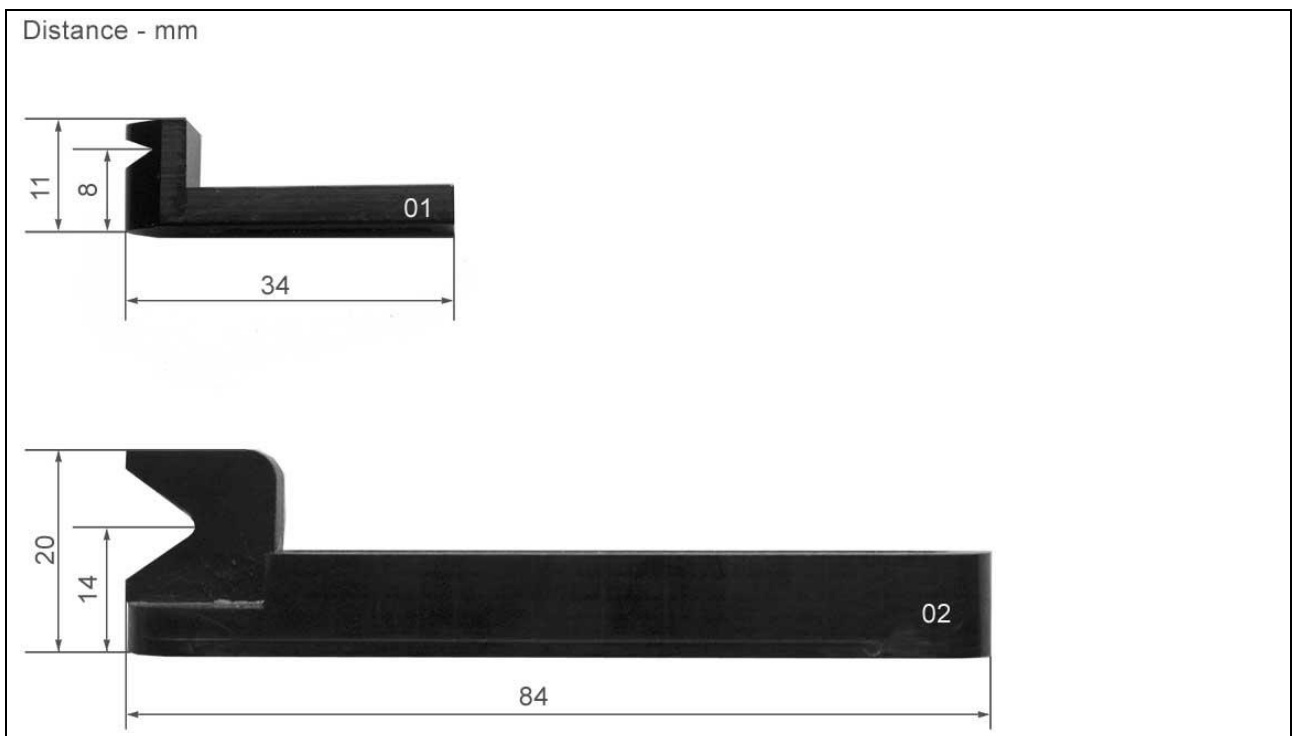


Figure 3: Dimensions of the claws for the UH DUT (claw 01 and claw 02)



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

4.2.3 GND 25 Holder

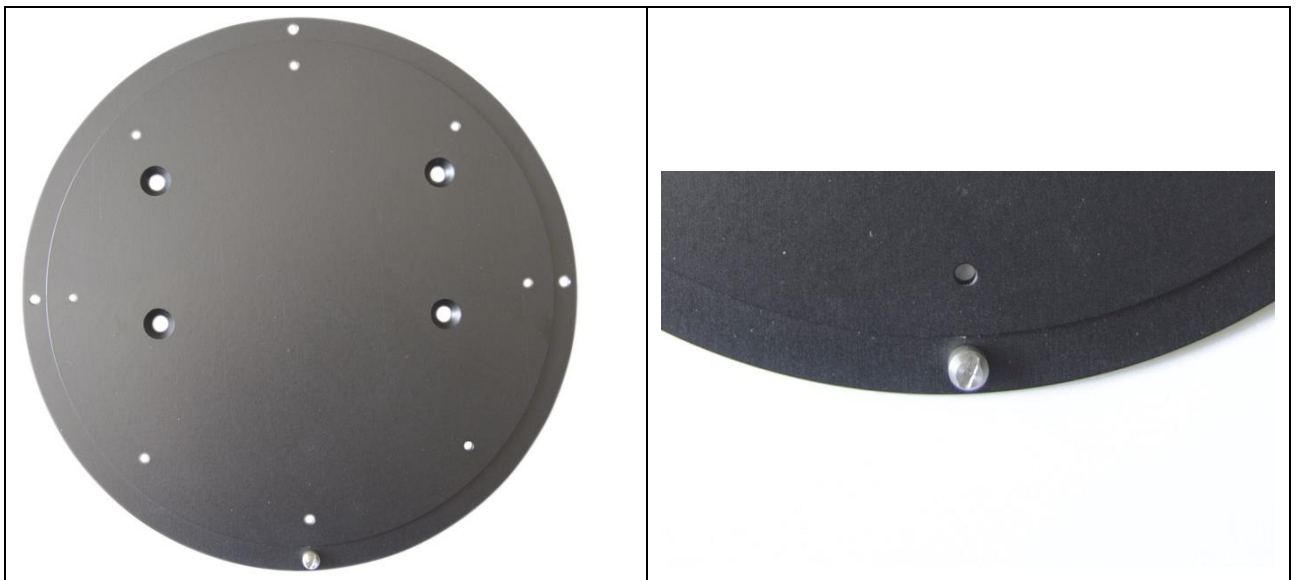


Figure 5: GND 25 holder

with anti-rotation element

4.2.4 GND 25 Ground Plane

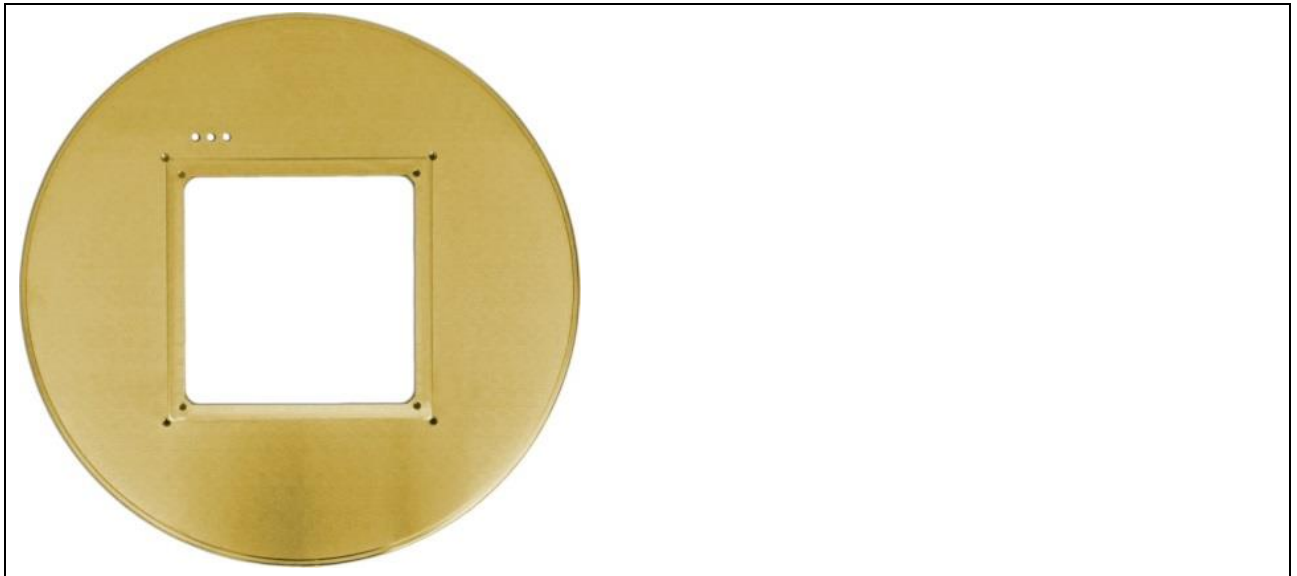


Figure 6: GND 25 ground plane

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 3: Technical parameters of the GND 25 ground plane

4.2.5 SH 01 Probe Holder

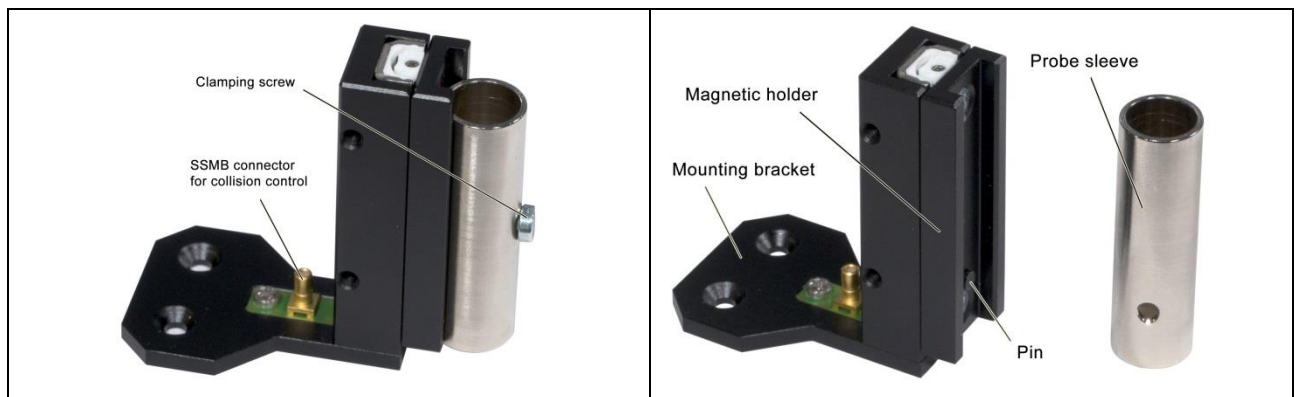


Figure 7: SH 01 probe holder

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

Table 4: Technical parameters of the SH 01 probe holder

4.2.6 SUH 106 Safety Enclosure

Length	1260 mm
Width	890 mm
Height	1000 mm
Connection	25-pin D-Sub
Weight	50 kg
Table 5: Technical parameters of the SUH 106 safety enclosure	

4.2.7 External NA5 EMERGENCY STOP Switch



Figure 8: External EMERGENCY STOP switch with cable and plug

Cable length	5 m
Table 6: Technical parameters of the external NA 5 EMERGENCY STOP switch	

4.3 Requirements for the ChipScan-Scanner Software

Operating system	Windows 7 64 bit (latest service packs)
Monitor resolution	(1280 x 1024) px
Hard-disk storage	1 GB minimum / 10 GB recommended

Table 7: System requirements for the ChipScan-Scanner software

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

Table 8: Computer specifications recommended for use with the ChipScan-Scanner software

4.4 Environment Conditions

Temperature range	10 – 30°C
Max. humidity (without condensation)	85%

Table 1: Environment conditions

5 Intended Use

The FLS 106 scanner is a positioning system for probes from Langer EMV-Technik GmbH and is used exclusively to test and/or carry out measurements on printed circuit boards (PCBs) and integrated circuits (ICs).

The system supports the following probe types from Langer EMV-Technik GmbH:

- ICR near-field micro-probes
- Passive near-field probes

The system allows the measurement of fields coupled out by the device under test (DUT).

The probes can be moved across the DUT surface on the X-, Y- and Z-axis. In addition, the FLS 106 IC allows the probe's rotation around the Z-axis. The probe tip position can be checked visually with the DM-CAM digital microscope camera at any time. The FLS 106 is controlled with the ChipScan-Scanner software via a computer.

The system is used for applications such as:

- Surface scans in compliance with standard DIN IEC/TS 61967-3
- Volume scans
- Pin scans

The FLS 106 scanner may only be used in accordance with the prerequisites described in section 6.1.

The user must comply with all information and instructions given in this user manual.

The FLS 106 scanner may only be used in an environment with a temperature of 10 to 30 degree Celsius and a humidity of 20 to 85 percent without condensation.

Keep the scanner free of foreign objects, dirt and liquids to prevent adverse effects on measurements and damage to the scanner.

5.1 Staff Requirements

Only persons who are trained and qualified in the field of electromagnetic compatibility (EMC) may operate the FLS 106 scanner.

Persons whose responses are impaired by alcohol, medicines, drugs or similar substances must not be allowed to operate the FLS 106 scanner.

5.2 Risks if Not Used for Its Intended Purpose



Danger due to misuse!

Incorrect use of the FLS 106 scanner can lead to dangerous situations!

Incorrect use of the FLS 106 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 FLS 106 scanner is used in a defective state.
- The FLS 106 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 scanner's abnormal use are excluded!

5.3 Safety Instructions

5.3.1 General Information

Risks cannot be totally excluded even if the FLS 106 scanner is used for its intended purpose.

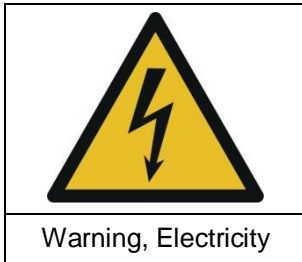
Observe the safety information and hazard warnings listed below to prevent damage to property and personal injury. Also observe the operating and safety instructions for all other devices used in the measurement set-up.

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 scanner.

→ Langer EMV-Technik GmbH assumes no liability for damage to property and/or personal injury or for consequential damage that arises from the incorrect unpacking, set-up or operation of the FLS 106 scanner.

5.3.2 Hazard Due to Electrical Voltage



Danger from electricity!

Risk of injury due to electric shock!

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

Do not connect or disconnect any cables whilst the FLS 106 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!

5.3.3 Hazard Due to Movements along the Axes



Danger from movement along the axes!

Risk of injury due to crushing!

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

Important: The scanner may only be operated within a protective enclosure (section 6.1.1 and 14.1.1) or with a spatial separation (section 6.1.2 and 14.1.2). As a result, attachments, probes and DUTs can only be installed and removed when the FLS 106 scanner is at a standstill.

5.4 Airborne noise emission if used for its intended purpose

The noise level is below 70 dB(A) if the FLS 106 scanner is used for its intended purpose

No ear protection is required.

6 Safety Devices

6.1 Prerequisites for Safe Operation

The FLS 106 scanner may only be operated if either

- a protective enclosure or
- a spatial separation in connection with the external NA 5 EMERGENCY STOP switch is used.

The FLS 106 scanner is stopped immediately if

- the EMERGENCY STOP switch on the device is actuated,
- the external EMERGENCY STOP switch is actuated,
- the protective enclosure is opened.

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

After the external NA 5 EMERGENCY STOP switch has been pressed, it has to be released by pulling before the scanner can be switched back on.

The scanner then has to be recalibrated with the software.

6.1.1 Operation with the Protective Enclosure

The FLS 106 scanner is operated inside the SUH 106 protective enclosure.

6.1.2 Operation with a Spatial Separation

The user provides a spatial separation at an appropriate distance to prevent persons from interfering with the scanner's operation. Measures such as cordoning off or fencing off the site are suitable precautions. The external EMERGENCY STOP switch has to be connected to the scanner and placed outside the isolated space so that it is accessible at any time.

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

The FLS 106 scanner can only be activated or operated via the software after passing a self-testing routine.

6.3 EMERGENCY STOP Switch

The emergency stop function is triggered by pressing the EMERGENCY STOP switch. The FLS 106 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.

6.4 Overcurrent Protective Device

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

7 Environmental Protection

Dispose of any packaging material paying due regard to the local environmental protection regulations.

Do not allow lubricants such as grease and oil based on mineral oils to escape into the environment. These lubricants must be disposed of in compliance with the local, official regulations through corresponding collection points.

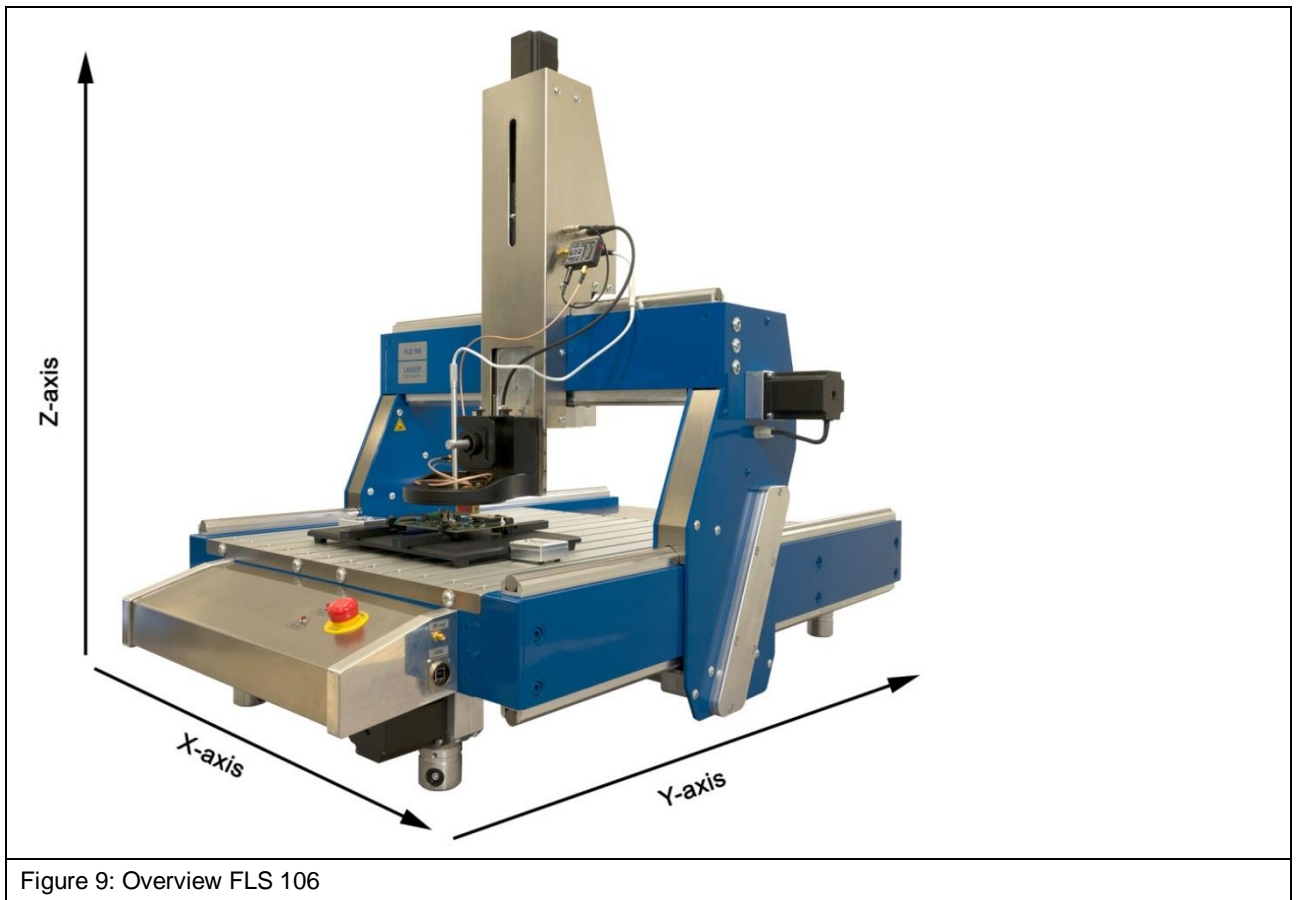
8 Nameplate

The nameplate is on the rear of the FLS 106 scanner and identifies the scanner clearly. The nameplate provides the following details:

- Name of the device
- Company name and full address of the manufacturer
- CE mark
- Serial number and article number
- Year of construction (year in which the manufacturing process has been completed)

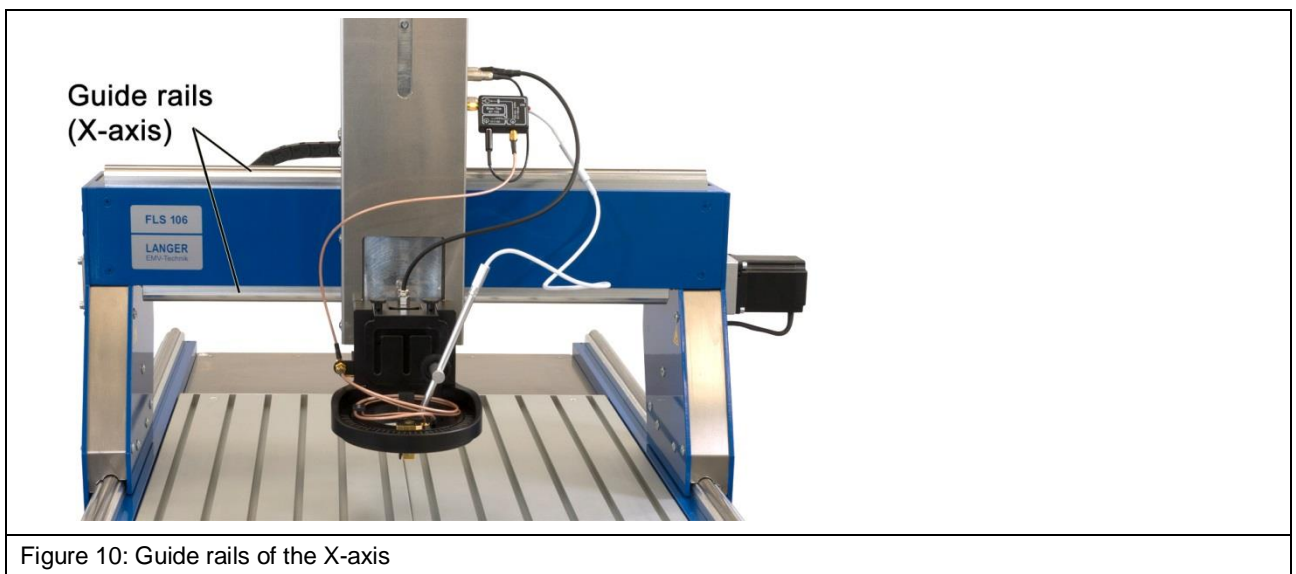
9 Overview of the FLS 106 Scanner

9.1 FLS 106 with Axis Designation



9.2 Description of the Subassemblies

9.2.1 Guide Rails along the X-Axis



The electrically driven stepping motor moves the Z-axis tower on the guide rails along the X-axis over a working range of 400 mm.

9.2.2 Guide Rails along the Y-Axis (Long Side)

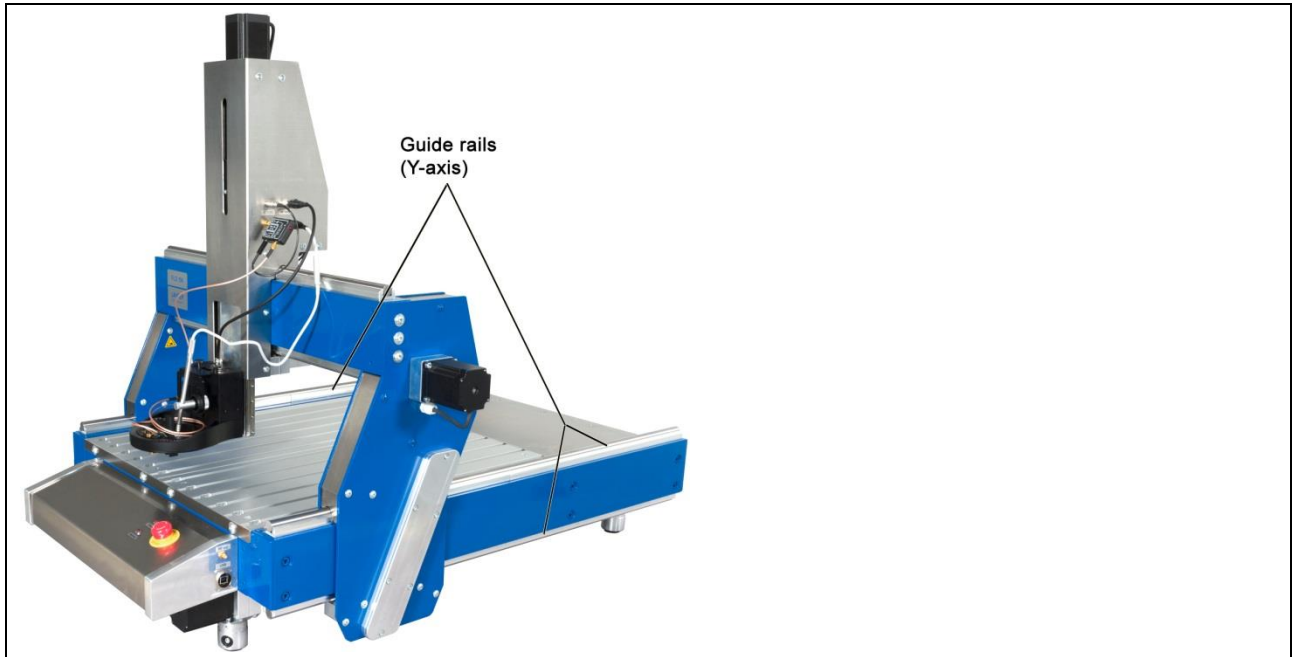


Figure 11: Guide rail along the Y-axis

The electrically driven stepping motor moves the gantry on the guide rails along the Y-axis over a working range of 600 mm.

9.2.3 Z-Axis Tower



Figure 12: Z-axis tower with rotary unit

A rotary unit is located at the bottom of the Z-axis tower on the FLS 106 IC. The SH 01 probe holder and the KA 220 camera arm are located at the bottom of the Z-axis tower on the FLS 106 PCB.

The Z-axis's positioning distance is 125 mm.

9.2.4 Gantry

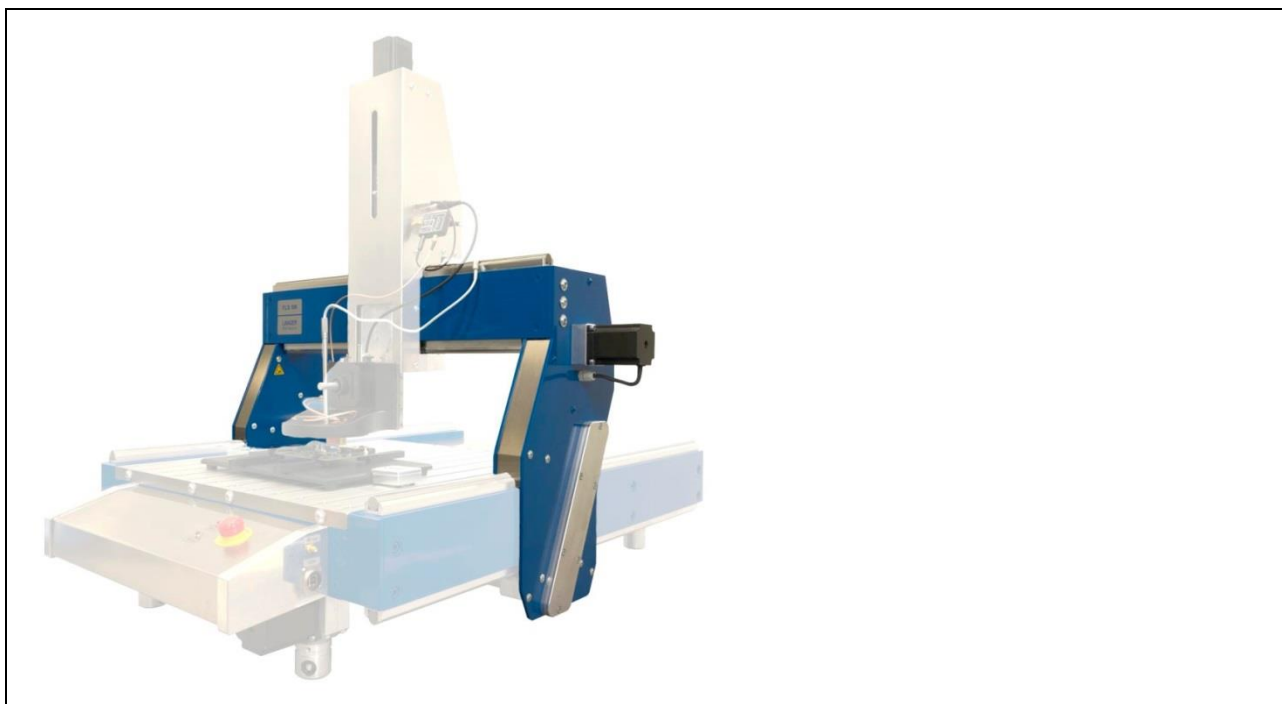


Figure 13: Gantry on the FLS 106

The gantry transports the probe that is attached to the rotary unit and the digital DM-CAM microscope camera along the Y-axis.

9.2.5 Rotary Unit

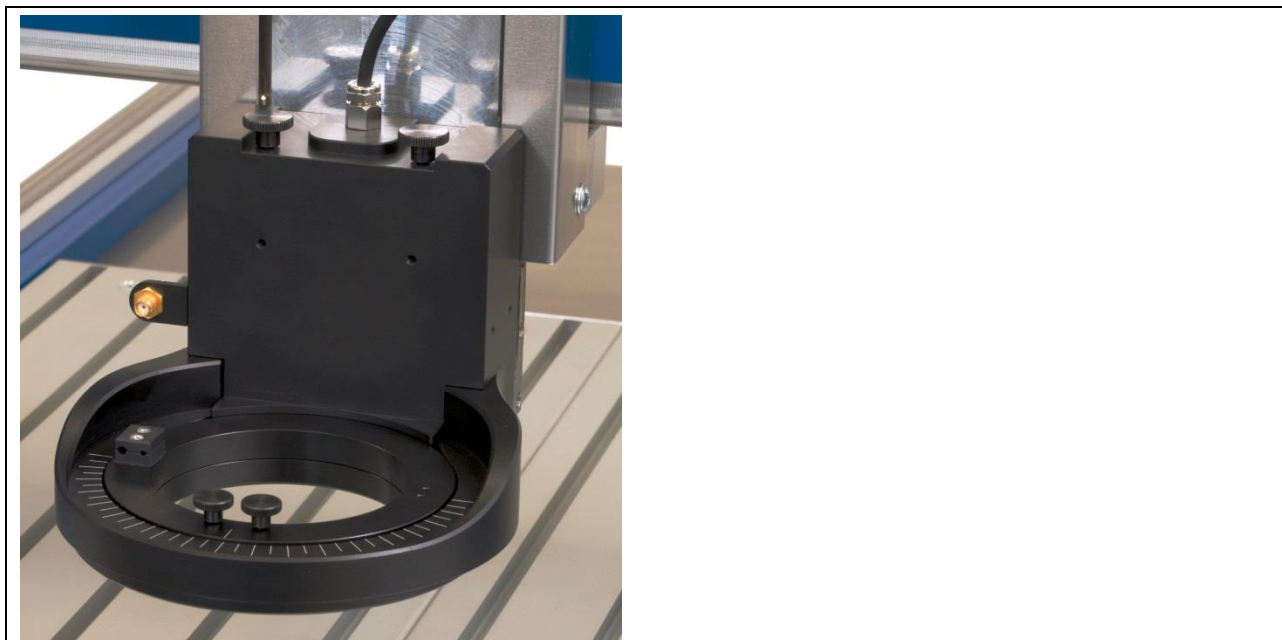


Figure 14: Rotary unit with SMA-SMA coupling and fastening screws

The FLS 106 IC scanner comes with a rotary unit as a standard feature.

The rotary unit 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 or the SH 01 probe holder can be mounted on the rotary unit's rotary ring.

The SMA measuring cables can be connected to the SMA coupling (Figure 15).

The SSMB-SSMB cable is connected to the SSMB port for collision control (Figure 15).



Figure 15: SMA coupling

9.2.6 Aluminium Mounting Bracket

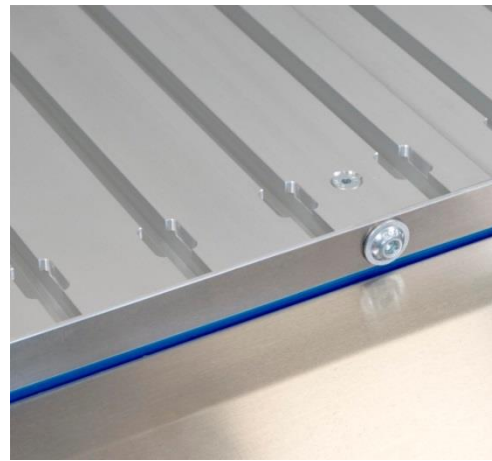
The FLS 106 PCB scanner comes with an aluminium mounting bracket as a standard feature.

The aluminium mounting bracket is used to mount the KA 220 camera arm and the SH 01 probe holder.

9.2.7 T-Slot Table



Figure 16: T-slot table



T-slots with openings for the T-nuts

The T-slot table (600 mm x 540 mm x 19 mm) has several hollow sections. T-nuts (Figure 17) can be inserted into the individual hollow sections (T-slots) to fasten the clamping pieces (Section 10.4) or the GND 25 holder (Section 10.6) with the corresponding screws (M8).

The T-slots' inside height and width is 13.6 mm (DIN 508).



Figure 17: Two versions of T-nuts

9.2.8 Control Panel with EMERGENCY STOP Switch and Control LEDs



Figure 18: Control panel of the FLS 106 scanner

The EMERGENCY STOP switch that is integrated in the control panel is used to stop the FLS 106 scanner immediately.

The *Power* LED shows if the scanner is switched on and the *Moving* LED shows if the scanner is in motion.

9.2.9 Height-Adjustable Machine Feet

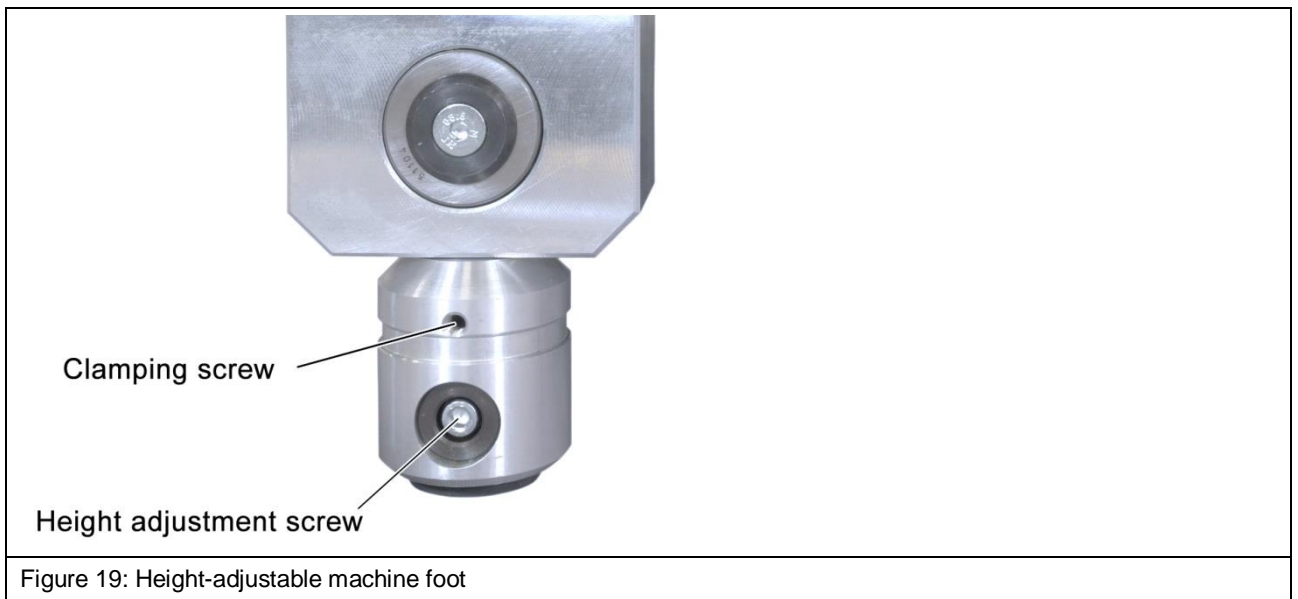


Figure 19: Height-adjustable machine foot

The height of the four machine feet can be adjusted separately to align and level the scanner.

9.3 ON / OFF Switch and Connectors

9.3.1 ON / OFF Switch



Figure 20: ON / OFF switch

An ON / OFF toggle switch is located on the rear of the FLS 106 scanner.

9.3.2 Power Supply Socket



Figure 21: Mains plug socket (power supply)

A C14 power supply socket is located on the rear of the FLS 106 scanner to the right of the ON / OFF switch.

9.3.3 Connector for External Emergency Stop Switch or Safety Enclosure



Figure 22: *ext. Stop* connector

The connector marked *ext. Stop* is located on the rear of the FLS 106 scanner and is used to connect the SUH 106 safety enclosure or the external NA 5 EMERGENCY STOP switch.

9.3.4 Connectors on the Z-Axis Tower



Figure 23: Connectors on the Z-axis tower

- HR10 connectors:

- 12-pin connector marked *Camera* to connect the DM-CAM digital microscope camera
- 10-pin connector marked *rot. Axis* to connect the rotary unit or the SSMB-HR10 cable (depth test cable)
- 6-pin connector marked *12 V DC* to connect the bias-tee or pre-amplifier power supply

- SMA connector marked *RF in* to connect a near-field probe, a bias-tee or pre-amplifier via an RF cable.

9.3.5 Connectors on the Control Panel

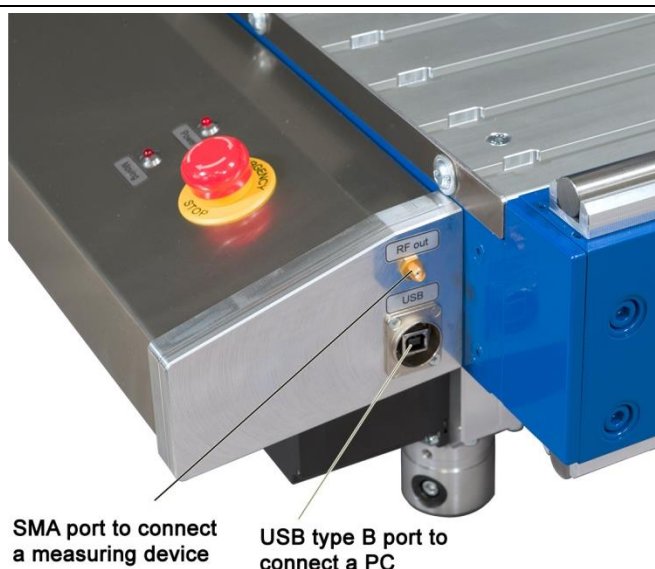


Figure 24: Connectors on the control panel: *RF out* and *USB*

- USB connector, type B, marked *USB* to connect a computer via the corresponding USB cable,
- SMA connector marked *RF out* to connect a measuring device such as a spectrum analyzer or oscilloscope via an RF cable.

10 Overview of Attachments

10.1 KA 220 Camera Arm

The KA 220 camera arm of the FLS 106 PCB scanner holds the DM-CAM digital microscope camera. It is attached to the aluminum mounting bracket.

The KA 220 is an infinitely adjustable articulated arm. The mechanical clamping system enables easy and exact positioning. The three joints of the KA 220 can be fixed and released by a single turn of the central clamping handle.



Figure 25: KA 220 camera arm

10.2 DM-CAM Holder.3

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



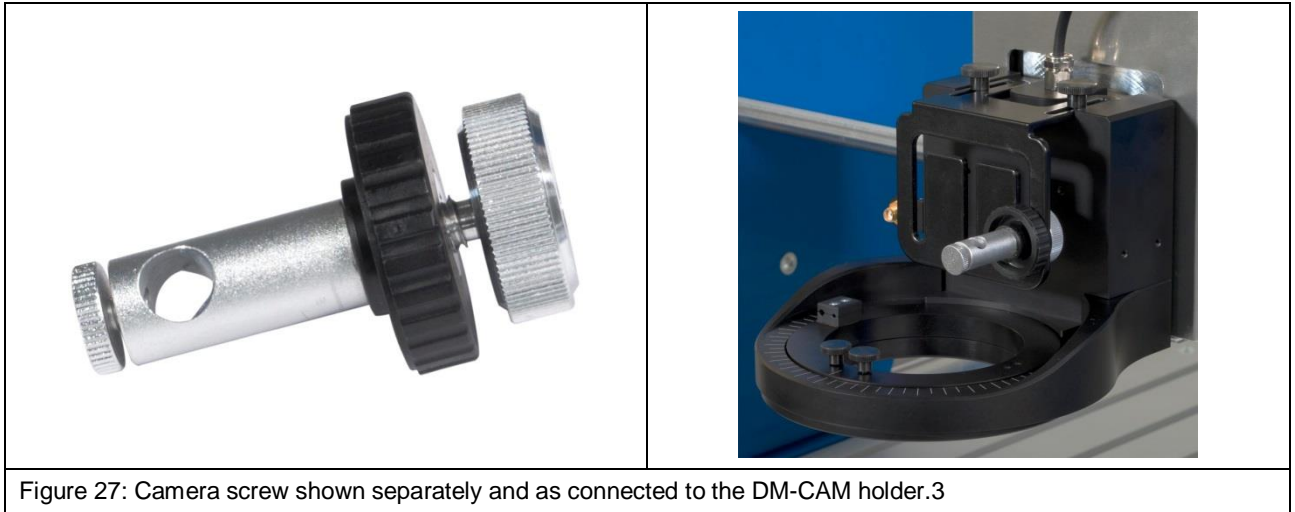
Figure 26: DM-CAM holder.3

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

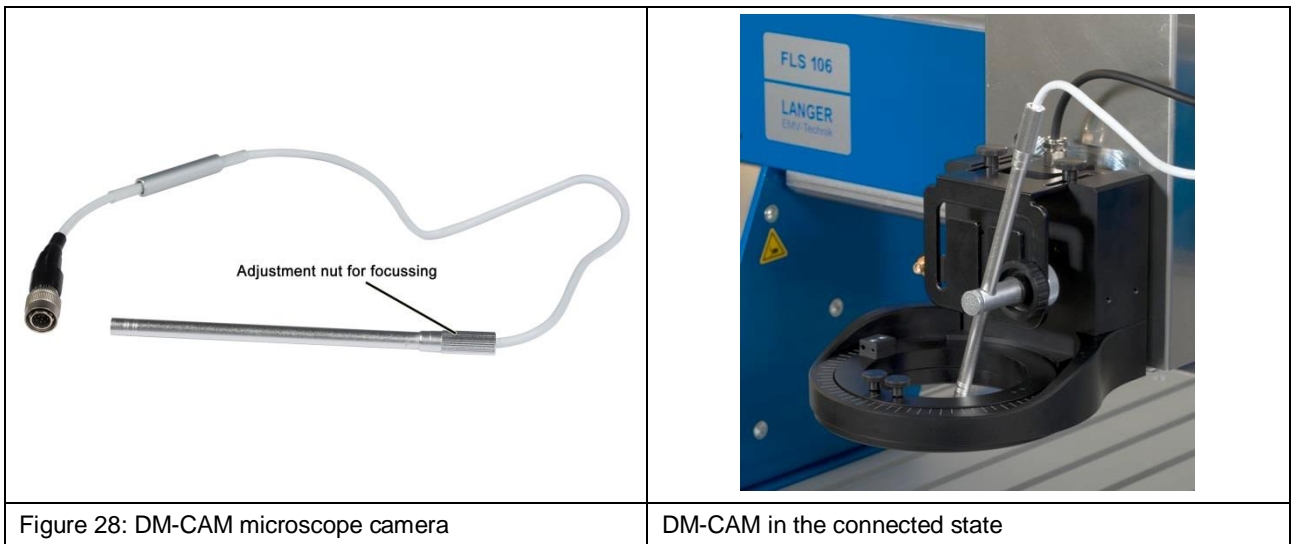
10.3 DM-CAM with Camera Screw

The digital DM-CAM microscope camera is used to observe the probe tip position and the distance between the probe tip and DUT.

The camera screw is used to mount the DM-CAM on 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-colored knurled screw. The large, silver-colored knurled screw and the large, black, knurled plastic nut are used to mount the camera screw on the DM-CAM holder.3.



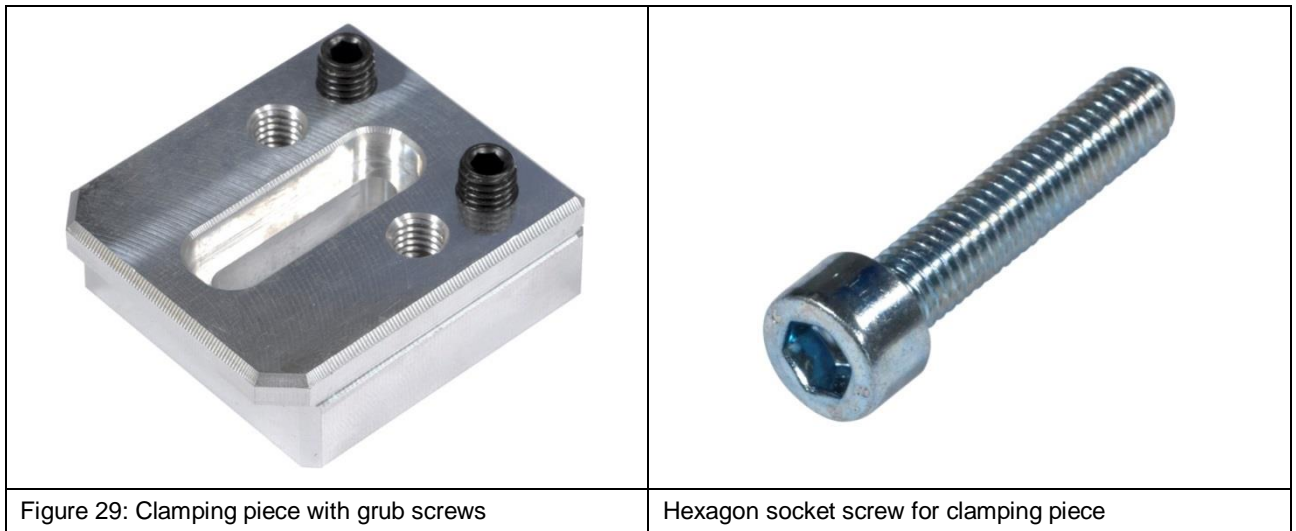
The DM-CAM is connected to the HR10 connector marked *Camera* on the scanner's Z-axis tower.

The DM-CAM's focus can be set by turning its rear knurled nut.

10.4 Clamping Pieces

The clamping pieces are used as fasteners to individually position and mount the UH DUT universal holder or a DUT on the FLS 106 scanner's T-slot table.

The clamping pieces can be mounted in a T-slot with the hexagon socket screw M6 (hexagon socket 5 mm) and a T-nut. The clamping pieces' angle and height can be adjusted with the two grub screws (hexagon socket 4 mm).

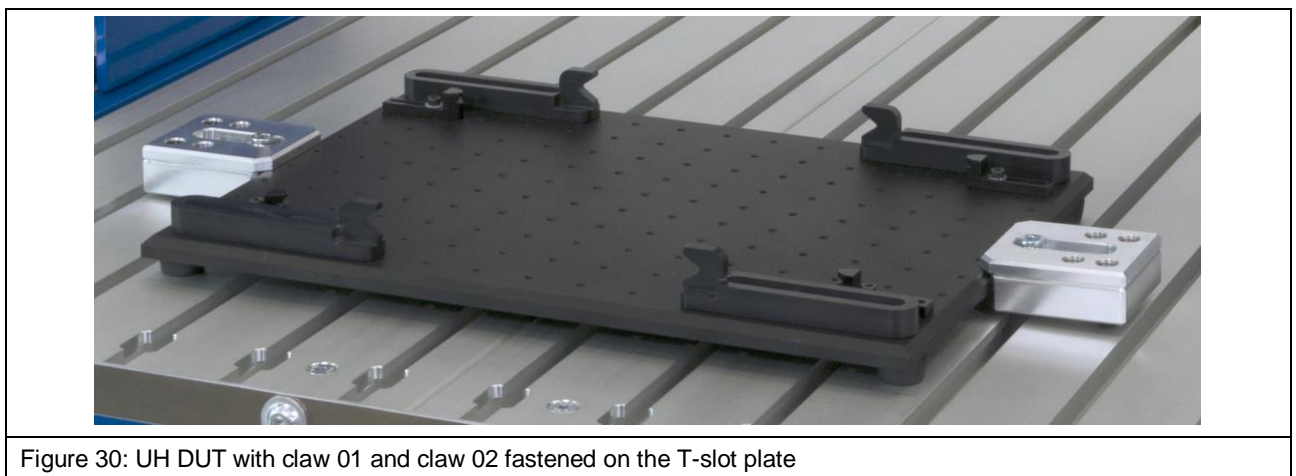


10.5 UH DUT with Claw 01 and Claw 02

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

The (20 x 20) mm grid of M3 threaded holes allows the DUT's individual positioning and the use of DUTs of different sizes.

The DUT can be fixed with the respective claw 01 and/or claw 02. The choice of the appropriate claws depends on the height of the DUT.



10.6 GND 25 Holder

The GND 25 holder holds the GND 25 ground plane.

The GND 25 holder can be mounted directly on the T-slot table or on the UH DUT universal holder.

An anti-rotation element can be screwed into one of the four outer holes of the GND 25 holder. The anti-rotation element prevents the GND 25 from turning.

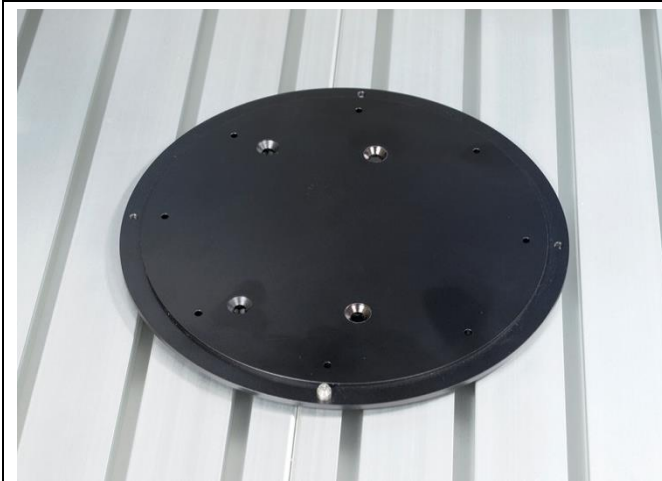


Figure 31: GND 25 holder on the T-slot table

10.7 GND 25 Ground Plane

The GND 25 ground plane 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 standardized test circuit boards (100 x 100 TEM cell) or your own test circuit boards.

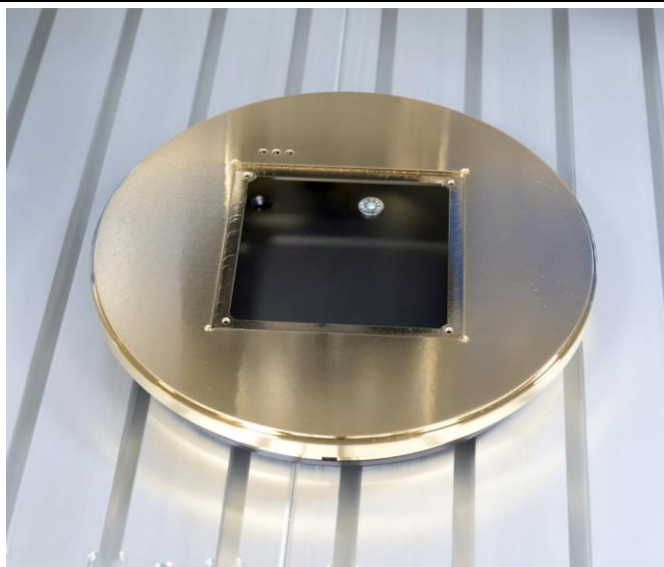


Figure 32: GND 25 ground plane on the T-slot table

10.8 SH 01 Probe Holder

The SH 01 probe holder 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 quickly loosened to easily install a probe, 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 33: SH 01 comprising the mounting bracket, 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 recognize 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 section 18.3 on how to set up the collision protection when the probe is moving down (collision control).



Figure 34: SH 01's magnetic holder and probe sleeve with SSMB connector and clamping screw to hold the near-field probe

11 Delivery

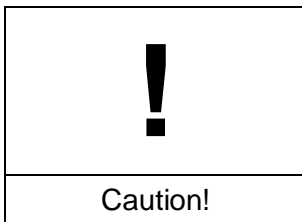
11.1 Transport

The FLS 106 scanner is delivered in a customized transport box. The scanner itself weighs 75 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.



Danger due to high weight!

Risk of injury to persons due to falling goods!



Material damage due to inappropriate transport possible!

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

11.2 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.

11.3 Storage

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

- Store the box in a dry place.
- Only store the box 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.

Note: Incorrect storage may damage the FLS 106 scanner, devices and/or accessories.

11.4 Opening the Transport Box

Ensure that the transport box is placed on level ground. Use appropriate tools to open the transport box and prevent damage to the equipment. Do not break open the box by brute force.

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.

11.5 Packaging

The packaging should prevent any damage during transport, corrosion and other damage. Therefore, it should only be removed shortly before the set-up. Dispose of the packaging material in compliance with the disposal regulations applicable at the place of installation.

Note: All packaging material should be stored for the time being in case the product needs to be returned.

12 Set-Up and Preparations for Putting the FLS 106 Scanner into Service

12.1 Preparations for the Safe Operation of the FLS 106 Scanner

There are two options to ensure the system's safe operation: use the SUH 106 safety enclosure or provide for a spatial separation (see Section 6.1).

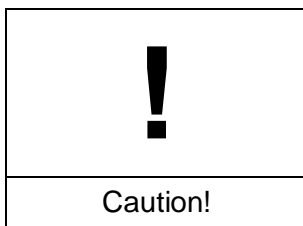
When choosing the place of installation, consider which of the aforementioned safety solutions is to be implemented.

12.2 Safety Instructions for the Set-Up of FLS 106



Danger due to high weight!

Risk of injury to persons due to falling goods!



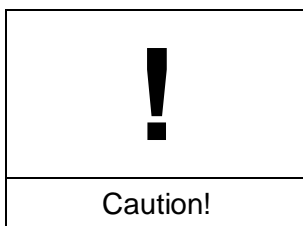
Material damage due to inappropriate transport possible!

Due to its high weight, the FLS 106 scanner must be transported by a minimum of two people and with the outmost care.



Danger due to incorrect set-up!

Faulty set-up can lead to personal injury and damage to property!



Damage to property due to inappropriate set-up!

Only remove the protective film (Section 12.5) after setting up the FLS 106 scanner at its place of installation.

The FLS 106 scanner may only be set up and used in closed rooms under appropriate light conditions.

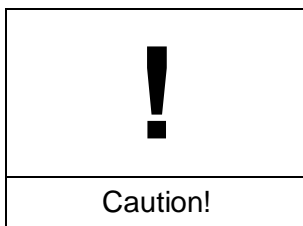
Make sure that the free working area around the scanner is large enough for the scanner to be handled properly.

Take the space requirements for cordoning off the area into account if you intend to operate the system with a **spatial separation**.

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

If you intend to operate the system with the **SUH 106 safety enclosure**, ensure that the worktop is large enough and its load-bearing capacity is not exceeded (total weight including the SUH 106 approx. 125 kg).

Secure the scanner and all individual components against falling down.



Damage to property due to incorrect tightening of screws!

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

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.

12.3 Setting up the FLS 106

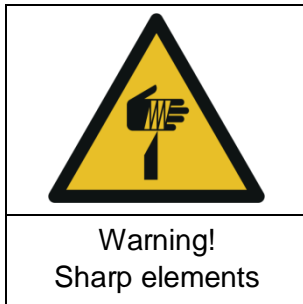
Place the FLS 106 scanner at its place of operation. Follow the instruction in Section 12.2.

12.4 Acclimatization of the FLS 106 Scanner

Give the scanner enough time to acclimatize before putting it into service if it is brought from a cold into a warm environment. Condensation may settle down on the scanner's surface. The condensation should be promptly removed with dry, clean cloths. Acclimatization may take up to several hours depending on the temperature difference. We recommend that further steps only be taken after the scanner has adjusted to the working area's ambient temperature.

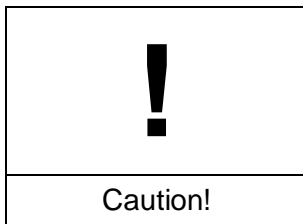
12.5 Removing the Protective Film

After setting up the scanner at its place of operation, remove the protective film.



Danger due to use of sharp-edged, metallic tools!

Sharp-edged, metallic tools can cause damage to persons by cuts!



Damage to property due to sharp-edged, metallic tools!

Remove the protective film only by hand.

Do not use any tools such as knives, cutters or scissors to remove the protective film. There is a risk that sharp-edged, metallic tools cause damage to the system, such as scratches on the scanner or damage to the insulation of cables or to persons by cuts.

12.6 Adjusting the Height-Adjustable Machine Feet

The height-adjustable machine feet allow the user to adjust the scanner to slightly uneven work surfaces.

The adjustable height is 3.8 mm.



Figure 35: Machine feet on the scanner

The feet can be set to the desired height with the height adjustment screw (hexagon socket 4 mm). The clamping screw (hexagon socket 2.5 mm) fixes the feet at the respective height.

Instructions on how to change the height of the feet:

- Loosen the height-adjustment lock by turning the clamping screw counter-clockwise.
- Turn the height-adjustment screw (hexagon socket 4.0 mm) clockwise to raise the scanner.
- Turn the height-adjustment screw counter-clockwise to lower the scanner.
- Tighten the clamping screw after adjusting the correct height.

12.7 Removing the Transport Protection from the Guide Rails

Langer EMV-Technik GmbH applies a thin layer of grease to all sliding rails so as to ensure appropriate corrosion protection during transport and storage. Remove this grease before putting the system into service.

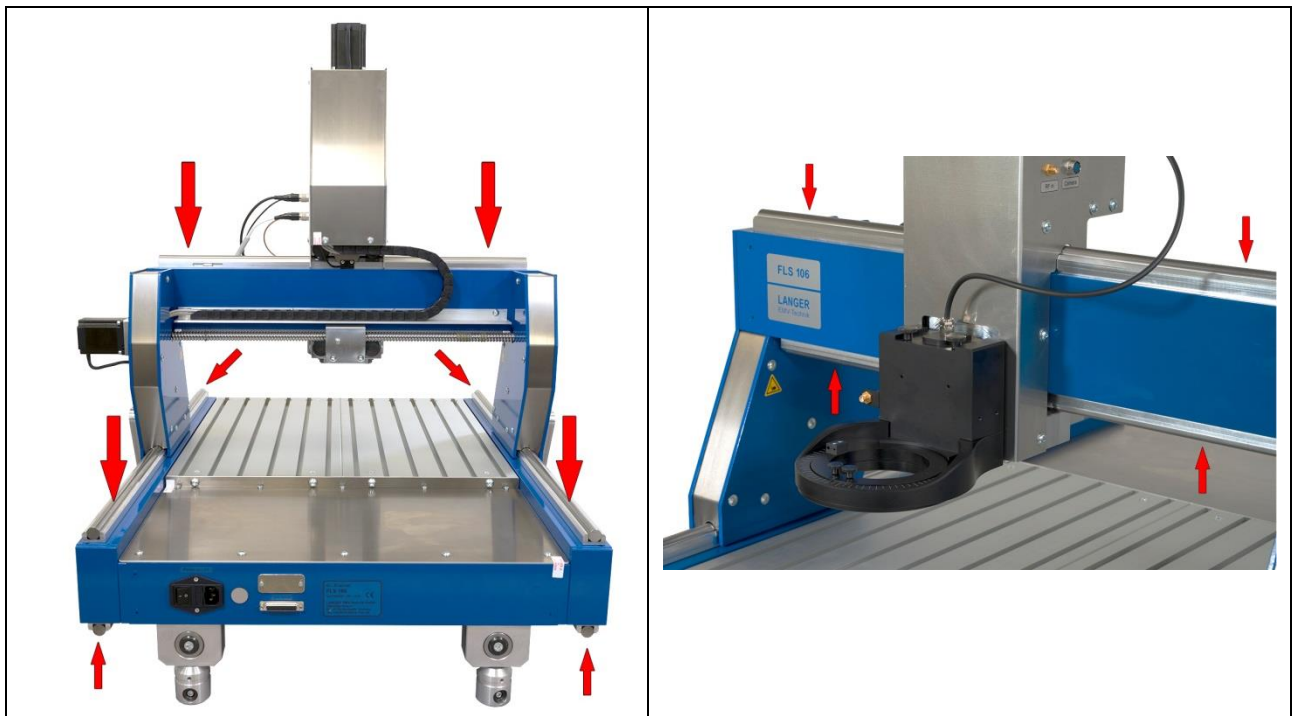


Figure 36: Cleaning the greased sliding rails with a paper towel

Use dry towels made of cloth or fabric to remove the grease. Dispose of the towels under due consideration of the local, official regulations.



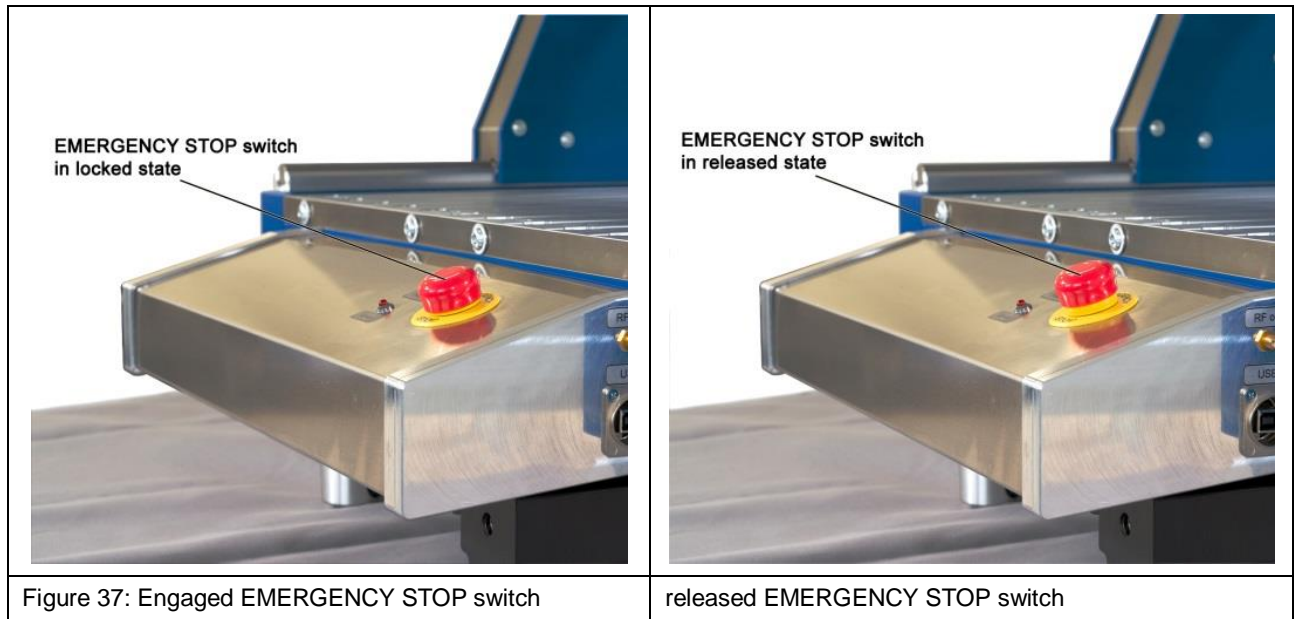
Wash the grease off with water and soap if it comes into contact with your skin!

Prevent the grease from coming into contact with your clothes, skin, hair and eyes.

12.8 Checking / Releasing the EMERGENCY STOP Switch

The FLS 106 is transported with the EMERGENCY STOP switch engaged.

If the EMERGENCY STOP switch is engaged, the scanner cannot be put into operation. Therefore, it should be checked whether the EMERGENCY STOP switch is engaged before switching on. If this is the case, the EMERGENCY STOP button must be turned in the direction of the imprinted arrows until it is unlocked (see Figure 37).



13 Putting the FLS 106 Scanner into Service for the First Time

Read Chapter 12 before putting the system into service for the first time.

Standard procedure:

- a) Install and connect the digital microscope camera:
 - refer to section 14.3.2 for FLS 106 IC or
 - refer to section 14.4 for FLS 106 PCB
- b) Check that the cable of the rotary unit is connected correctly (connect if necessary) (Figure 40).
- c) Connect the mains cable (Figure 49).
- d) Ensure the system's safe operation:
 - set up the spatial separation and connect the external NA 5 EMERGENCY STOP switch (section 14.1.2) or
 - set up and connect the SUH 106 safety enclosure (section 14.1.1)
- e) Check the EMERGENCY STOP switch and release if necessary (section 12.8).
- f) 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) (section 14.7).
- g) Connect the scanner to the computer via a USB type A/B cable (section 14.6).
- h) Close the SUH 106 safety enclosure if this option has been chosen.
- i) Switch on and boot the computer.
- j) Switch on the scanner and install the driver on the computer (section 15.2).
- k) Install the ChipScan-Scanner software on the computer (section 15.3).
- l) Start the ChipScan-Scanner software and detect the devices that are connected (section 15.4).
- m) Calibrate and test the scanner via the ChipScan-Scanner software (section 15.4 item 4).

14 Installation

14.1 Ensuring the System's Safe Operation

14.1.1 Operation with the SUH 106 Safety Enclosure

The safety enclosure protects the user and prevents any work on the scanner whilst it is in operation.

Install the SUH 106 safety enclosure according to the corresponding user manual and connect the SUH 106 connecting cable to the port marked *ext. Stop* of the FLS 106 scanner.

The EMERGENCY STOP switch on the scanner has to be released and the SUH 106 door closed before the scanner can be started.

14.1.2 Operation with Spatial Separation and External NA 5 EMERGENCY STOP Switch

A spatial separation protects the user and can prevent any work on the scanner whilst it is in operation.

The spatial separation must meet the following requirements:

- stable overall structure made of a durable material
- clearly recognizable as a separation (use bright colors if necessary)
- the separation must be provided around the scanner without any interruptions
- the distance to the scanner must be sufficient to safely prevent any interference with the scanner.

The spatial separation can be provided by different means such as separators, barriers with barricade tape, protective fences, light barriers, light grids, etc.

The external NA 5 EMERGENCY STOP switch has to be placed outside the spatial separation so that it can be seen and reached at any time.

The D-Sub connector of the external EMERGENCY STOP switch has to be installed before putting the scanner into service as otherwise a fault message appears and the operation is prevented.



Figure 38: D-Sub port (*ext. Stop*)



Figure 39: NA 5 EMERGENCY STOP switch with D-Sub connector

14.2 Checking the Cables of the Rotary Unit

Check that the rotary unit is connected to *rot. Axis* on the Z-axis tower.



Figure 40: Cable of the rotary unit on the "rot. Axis" connector

14.3 Installing the Digital DM-CAM Microscope Camera on the FLS 106 IC

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

Mount the DM-CAM holder.3 (Figure 41) for the camera on the rotary unit with two black knurled screws M4.

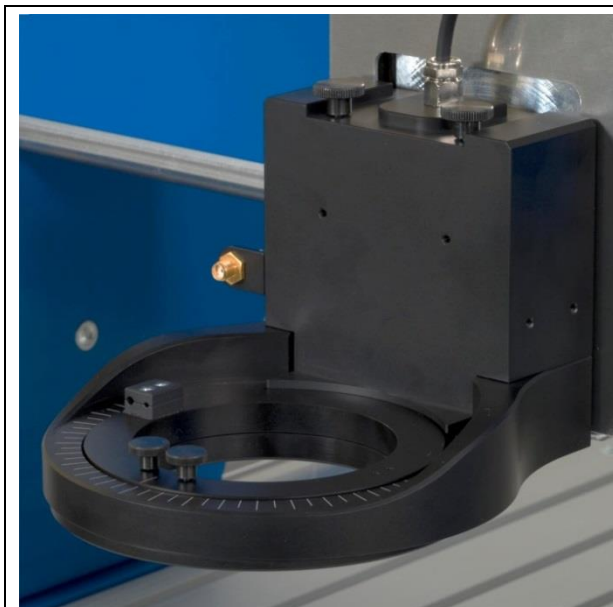


Figure 41: Rotary unit without DM-CAM holder.3

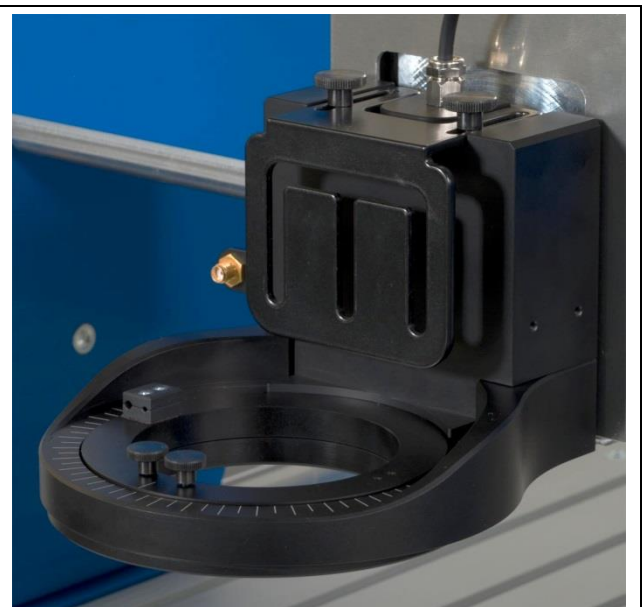


Figure 42: DM-CAM holder.3 camera holder mounted on the unit

14.3.2 Installing the DM-CAM Digital Microscope Camera

Use the large, silver-colored knurled screw and the black, knurled plastic nut to mount the camera screw on the DM-CAM holder.3. Insert the digital microscope camera into the opening of the camera screw and fix it in the desired place with the small, silver-colored knurled screw. The microscope camera can be installed before or after mounting the DM-CAM holder.3.



Figure 43: Mounted camera screw



Camera screw shown in detail

Then connect the DM-CAM cable to the HR10 connector marked *Camera* on the Z-axis tower (Figure 44).

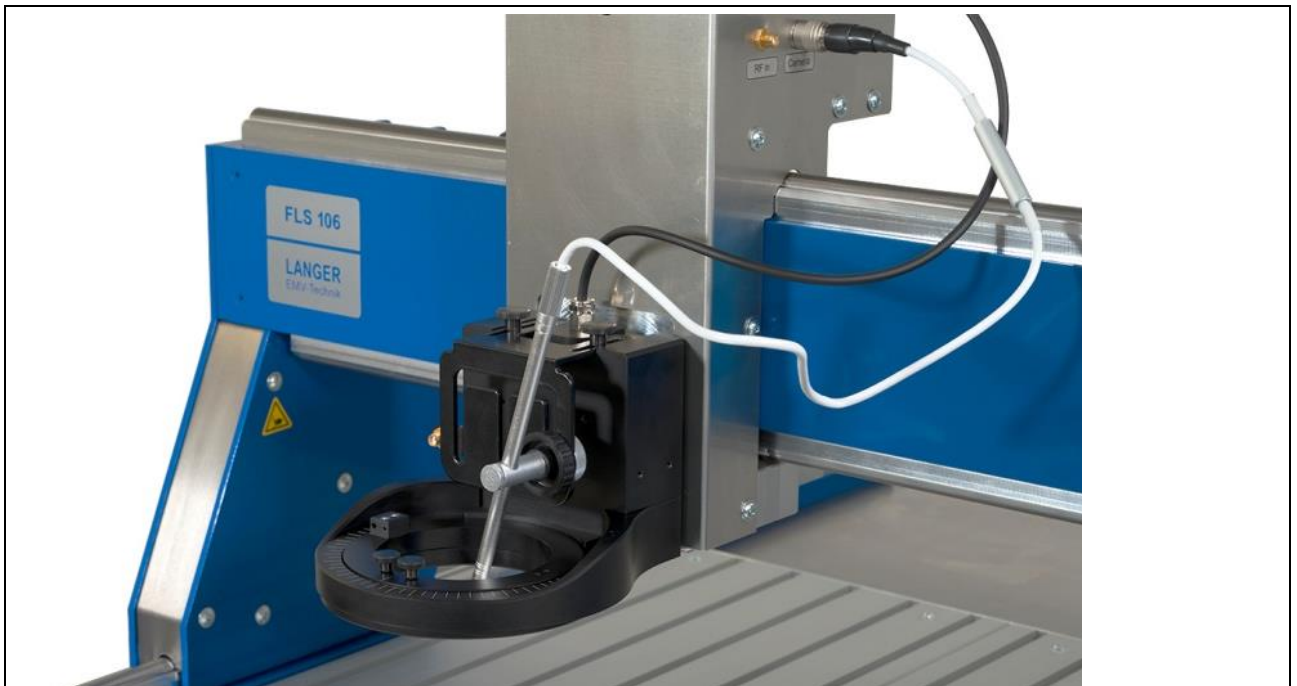


Figure 44: Digital DM-CAM microscope camera installed and connected to the Z-axis tower via a cable

14.4 Installing the DM-CAM Digital Microscope Camera on the FLS 106 PCB

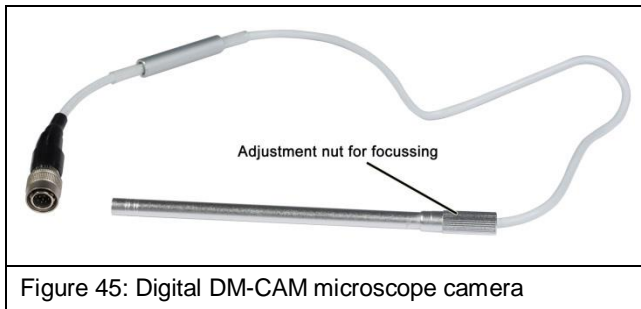


Figure 45: Digital DM-CAM microscope camera



Figure 46: KA 220 camera arm

Mount the DM-CAM on the KA 220 camera arm (Figure 47) with the FLS 106 PCB. Insert the DM-CAM into the opening of the camera screw located on the camera arm and fix with the small, silver-colored knurled screw.

The DM-CAM can be individually positioned by releasing the central clamping handle.

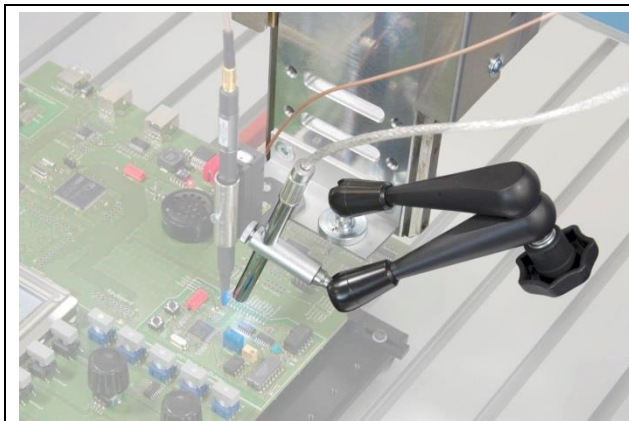


Figure 47: Digital DM-CAM microscope camera installed on the KA 220 camera arm



Figure 48: Connecting the HR10 plug of the DM-CAM to the "Camera" connector on the Z-axis tower

Then connect the HR10 plug of the DM-CAM connecting cable to the *Camera* connector on the Z-axis tower of the FLS 106 PCB (Figure 48).

14.5 Connecting the C13/C14 Device Lead

The power supply is provided via the supplied device lead. Plug the power supply plug (C13) into the power supply socket (C14) (Figure 49).



Figure 49: Plugging the power supply plug (C13) into the power supply socket (C14)

Power supply plug plugged into power supply socket

14.6 Connecting a Computer

Use a USB 2.0 type A/B cable (fully rated, Hi speed, maximum length of 2 meters) to connect the scanner to a computer. Connect the USB type A plug to the computer and the USB type B plug to the USB type B port (Figure 50) on the FLS 106 scanner's control panel.



Figure 50: Connecting the USB type B plug to the scanner's USB type B port

14.7 Connecting a Measuring Device for Near-Field Scans using the Example of a Spectrum Analyzer

To connect a spectrum analyzer to the FLS 106 scanner, one end of the corresponding measuring cable is connected to the spectrum analyzer's RF input and the other end (SMA plug) to the *RF out* SMA connector on the FLS 106 control panel (Figure 51).

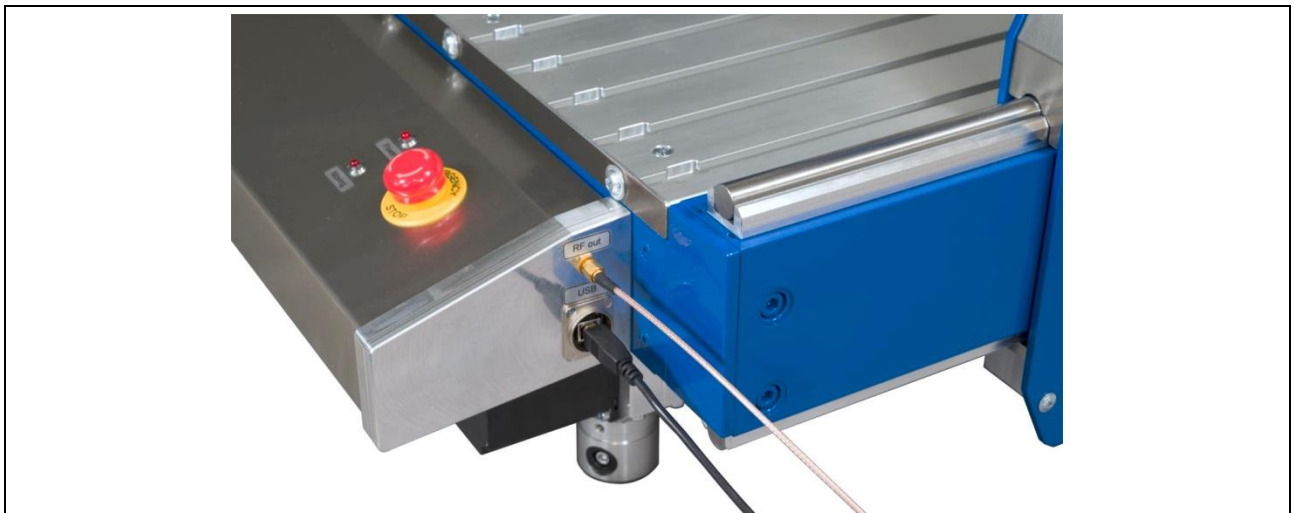


Figure 51: Connecting the measuring cable with SMA plug to the scanner's "RF out" port

Please refer to the annex of the ChipScan-Scanner software user manual or the Langer EMV-Technik website for a list of measuring devices supported by the ChipScan-Scanner software¹.

¹ www.langer-emv.com/fileadmin/ChipScan-ESA%20Supported%20Spectrum%20Analyzers.pdf

14.8 Switching the FLS 106 Scanner on

To switch on the scanner, the device lead must be properly connected and the toggle switch on the rear of the scanner pushed into the “I” position.

After switching the FLS 106 on, the control panel LED marked *Power* lights up.

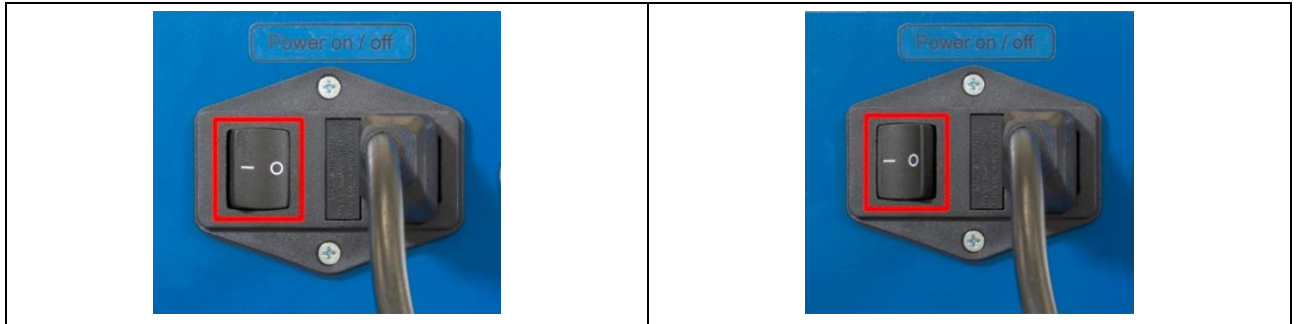


Figure 52: Switching the scanner on

15 Software Installation

15.1 Note on Software Installation

Put the device into service as described in chapter 13 before installing the software.

15.2 Installing the scanner driver

As the driver is not installed automatically by Windows when the IC scanner is connected to your computer, the driver installation needs to be done manually.

Process:

- a) Connect the scanner to the computer via the USB type A/B cable (section 14.6).
- b) Switch on and boot the computer.
- c) Switch the scanner on (section 14.8).
- d) Plug in the USB memory stick containing CS-Scanner software.

Then on the computer:

- 1) Open the Windows *Control Panel*, search for and open the *Device Manager*.
- 2) Double click the *Trinamic Stepper Device* entry under *Other Devices*.



Figure 53: Device manager with the *Trinamic Stepper Device* entry and an attention sign

- 3) In the appearing properties dialog select *Driver* tab and click on *Update Driver*.

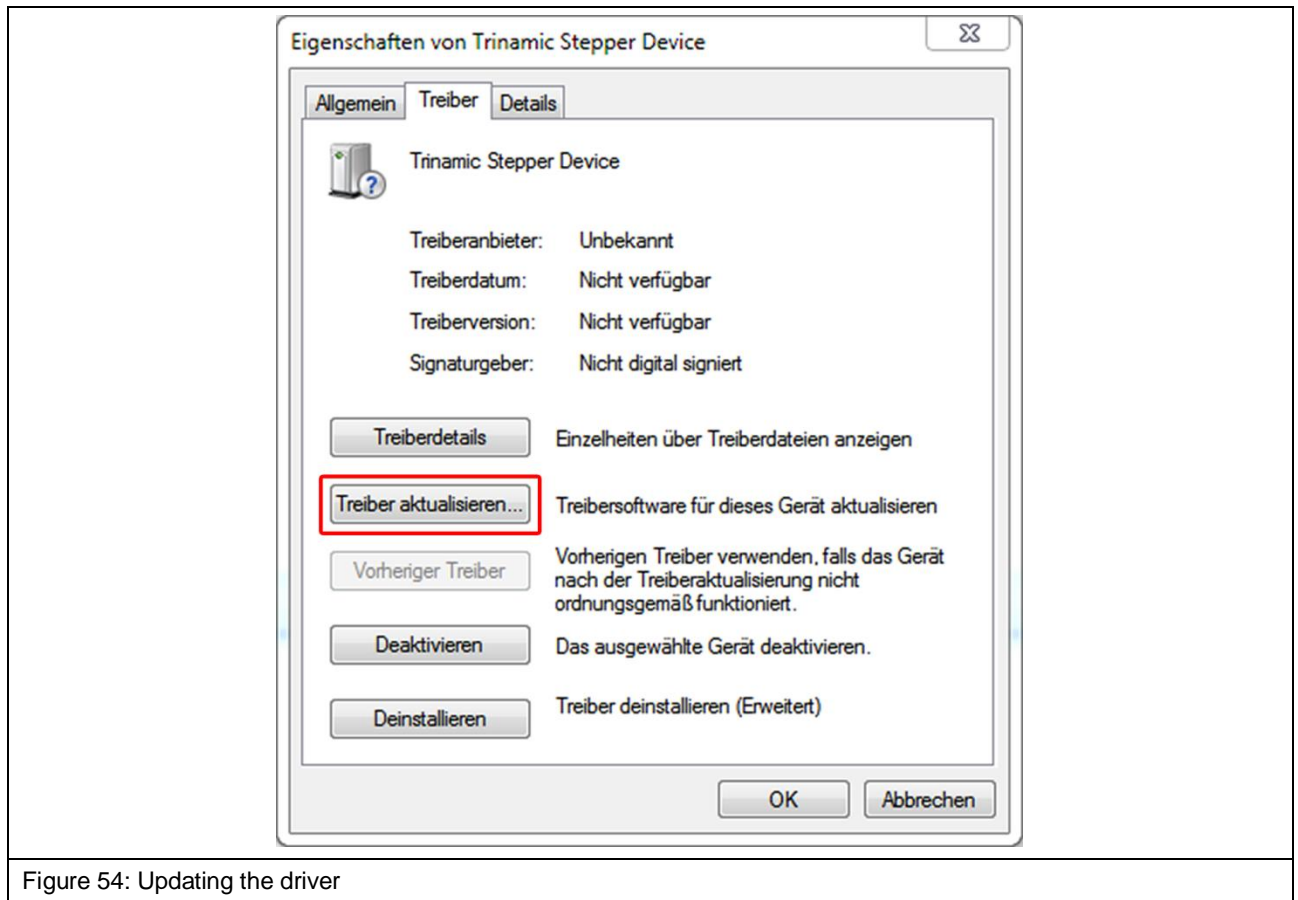


Figure 54: Updating the driver

- 4) In the following dialog choose the option *Browse my computer for driver software*.

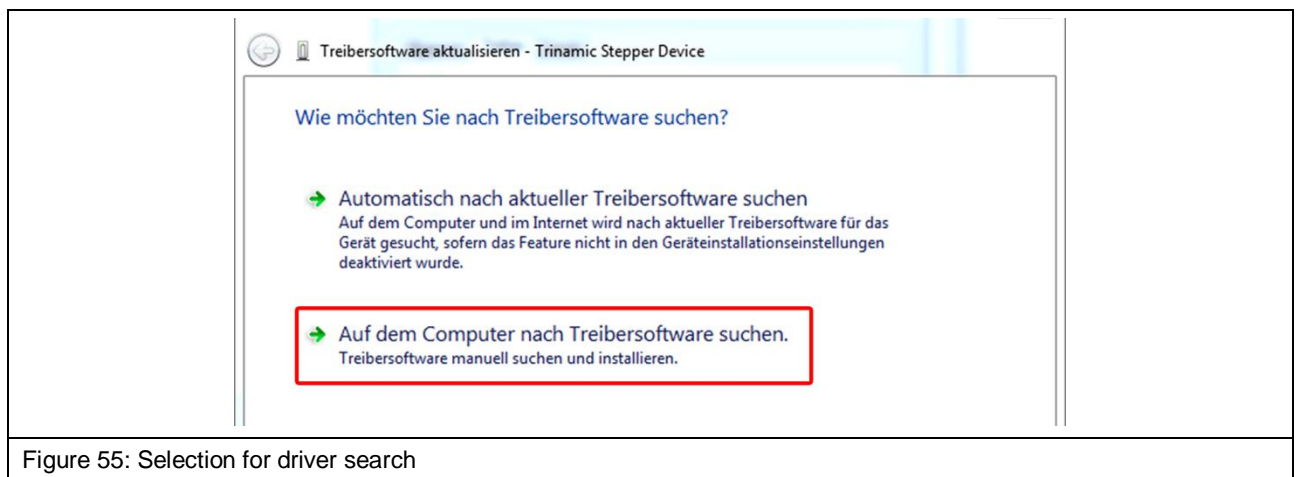


Figure 55: Selection for driver search

- 5) Click the *Browse* button that appears, select the USB memory stick, select the *Driver* subfolder and click the *OK* button.

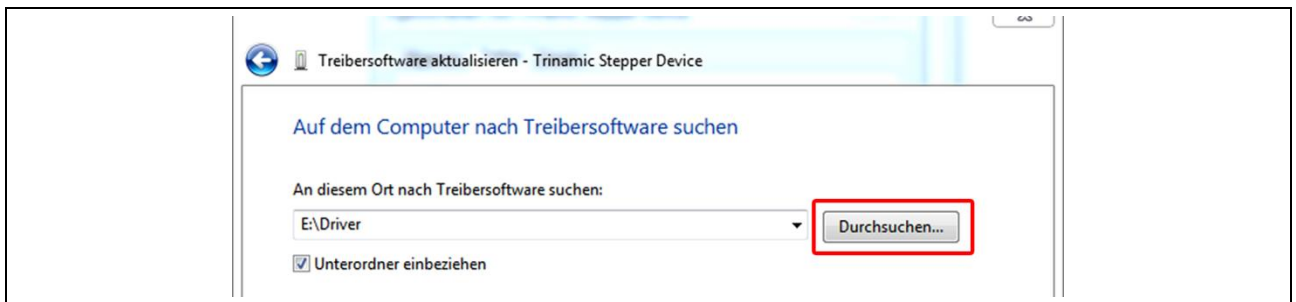


Figure 56: Browsing the enclosed USB memory stick for the driver

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



Figure 57: The scanner driver has been installed (the warning sign has disappeared)

15.3 Installing the ChipScan-Scanner Software

Please refer to the 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" folder on the enclosed USB memory stick.

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

1. To start the installation process, access the *ChipScan-Scanner* folder on the USB 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 screen.
3. Complete the installation

15.4 Putting the FLS 106 Scanner into Service with the ChipScan-Scanner Software

Ensure that the system has been set up as described in chapter 13 (item a – k).

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 following steps have to be carried out to check whether the FLS 106 scanner functions properly:

1. Switch on
 - a) the FLS 106 scanner and
 - b) the computer with ChipScan-Scanner software installed.
2. Start the ChipScan-Scanner software.

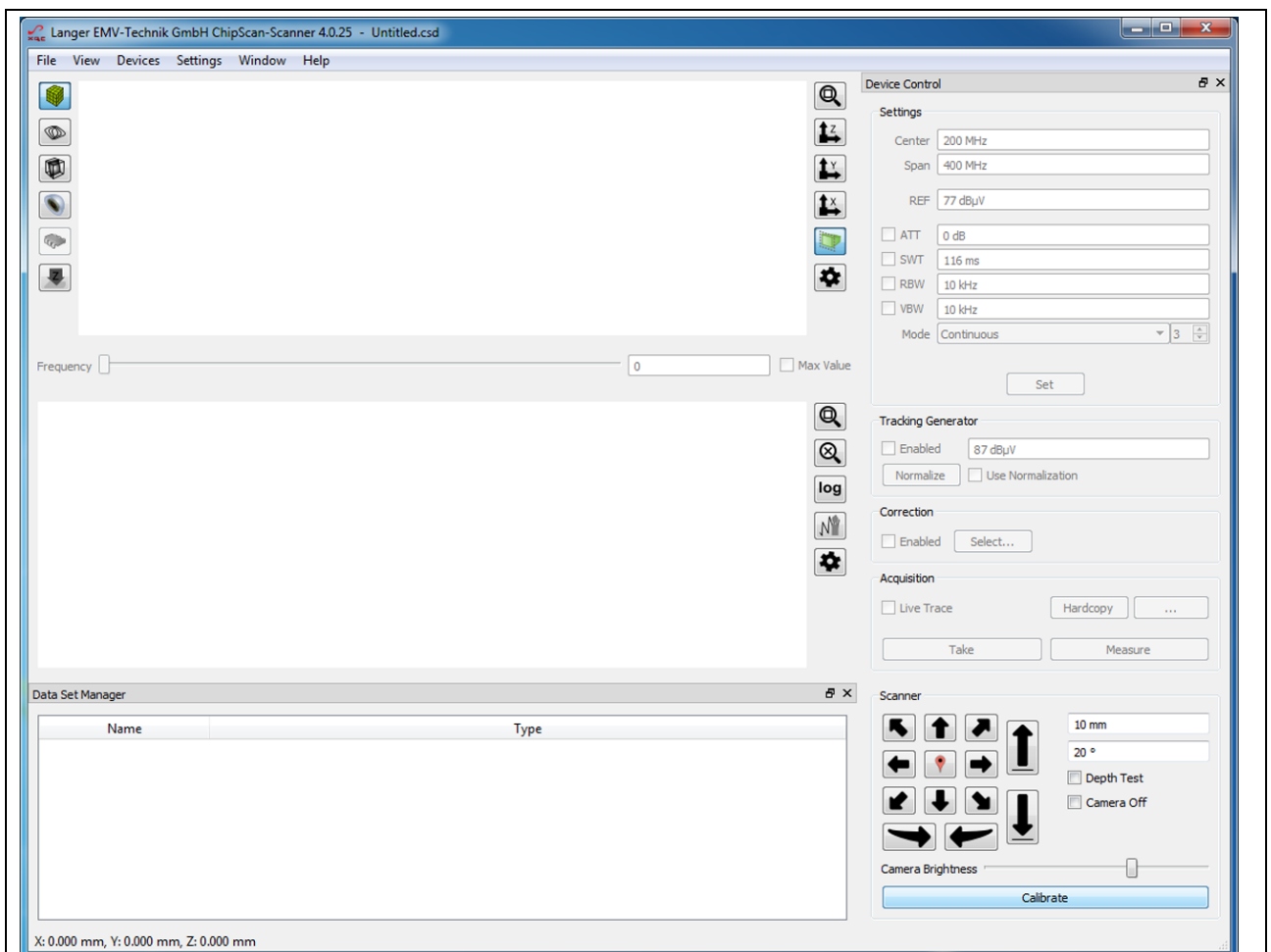


Figure 1: User interface of ChipScan-Scanner software

3. Connect the ChipScan-Scanner software to the FLS 106 scanner:

- Click the *Device Manager...* entry in the *Devices* menu in the ChipScan-Scanner 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*

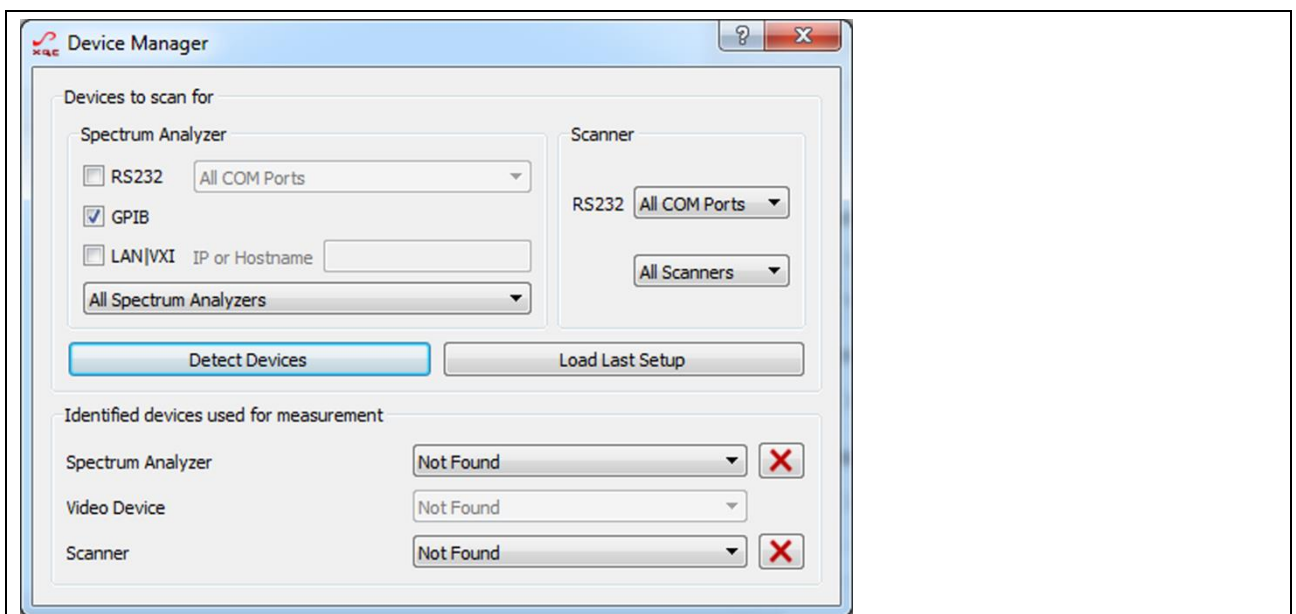


Figure 2: Device Manager of ChipScan-Scanner

- 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 FLS 106* 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.

Note: Please refer to chapter 4 in the ChipScan-Scanner software user manual for further information on device detection.

4. Calibrate the FLS 106 scanner.

- Click *Calibrate* (lower right corner) to move the scanner to its home position. **Note:** This has to be done each time the ChipScan-Scanner software is started, each time the scanner is switched on and each time the scanner is stopped with the EMERGENCY STOP switch.
- The scanner can then be moved into the desired position with the arrow keys of the directional pad.

5. 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 at the rear end of the DM-CAM.

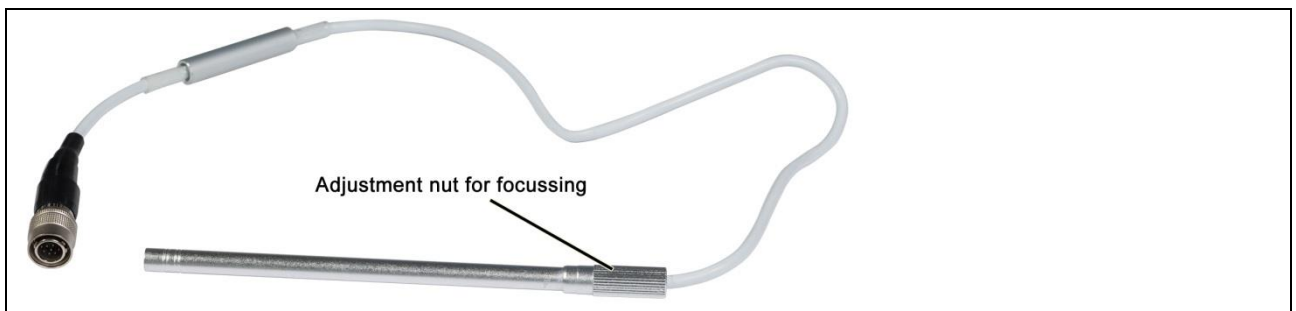


Figure 58: DM-CAM microscope camera with adjustment nut

16 Fastening the Device Under Test

16.1 Fastening a Device Under Test With the Clamping Pieces

Fasten the clamping pieces with the hexagon socket screws M6 (hexagon socket 5 mm) and the T-nuts in the selected T-slots.

The clamping pieces' angle and height can be changed with the grub screws M8 (hexagon socket 4 mm).

Note: Scratches and/or other traces may be left on the T-slot table if the clamping pieces are fastened too tight, fasten the screw only hand-tight.

Process:

Insert the first T-nut into the desired T-slot and move to the desired position.

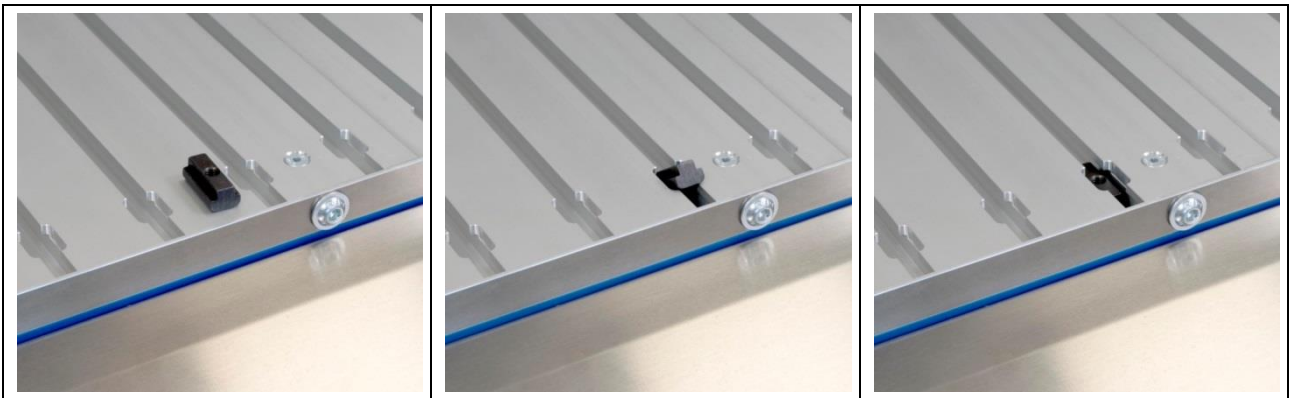


Figure 59: Inserting the T-nut into the T-slot

Then place the clamping piece above the T-nut and secure loosely with the hexagon socket screw M6.

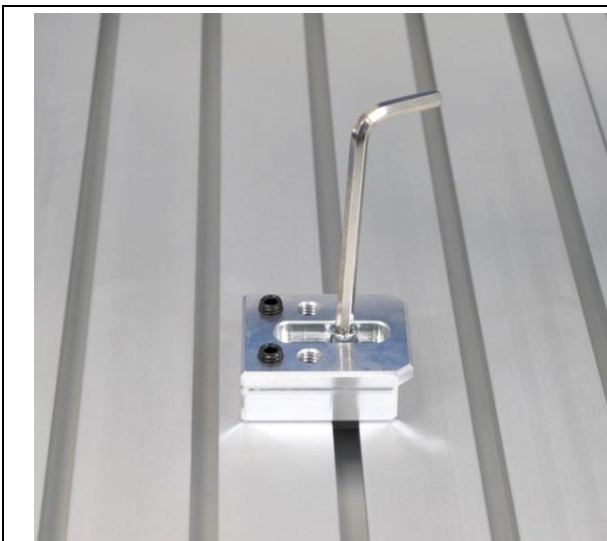


Figure 60: Fastening the clamping piece with the hexagon socket screw on the T-slot plate



Figure 61: Adjusting the height and angle of the clamping piece with the grub screws

Adjust the height and angle with the grub screws so that the device under test can be pushed under the projecting part of the clamping piece. Align the device under test and fix the clamping piece with the hexagon socket screw M6.

Repeat the aforementioned steps for the second clamping piece on the opposite side of the device under test.

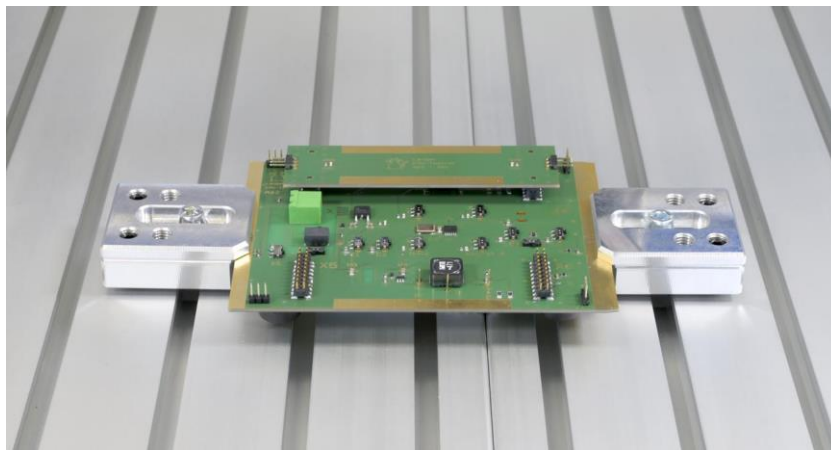


Figure 62: Device under test installed between two clamping pieces

Check that the device under test is held firmly enough so that it cannot slip away.

16.2 Fastening a Circuit Board on the UH DUT Universal Holder

16.2.1 Installing the UH DUT

Note: Scratches and/or other traces may be left on the T-slot table if the clamping pieces are fastened too tight. Take due care.

Place the UH DUT universal holder on the T-slot table precisely in the middle between two T-nuts (Figure 63).

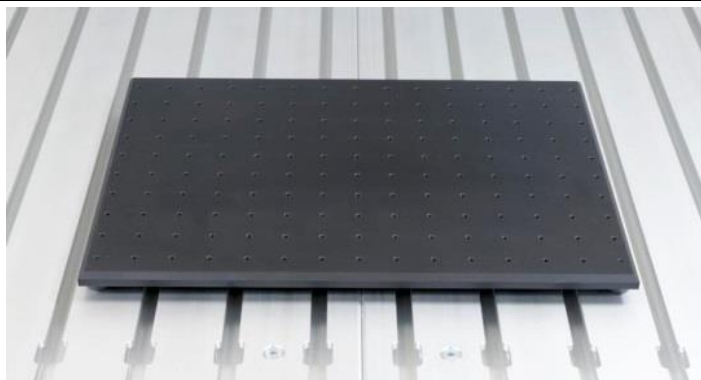


Figure 63: Positioning the UH DUT

Insert a T-nut into each of the T-slots directly alongside the UH DUT and push them up to the middle of the UH DUT.

Place the clamping pieces above the T-nuts and secure loosely with the hexagon socket screw M6.

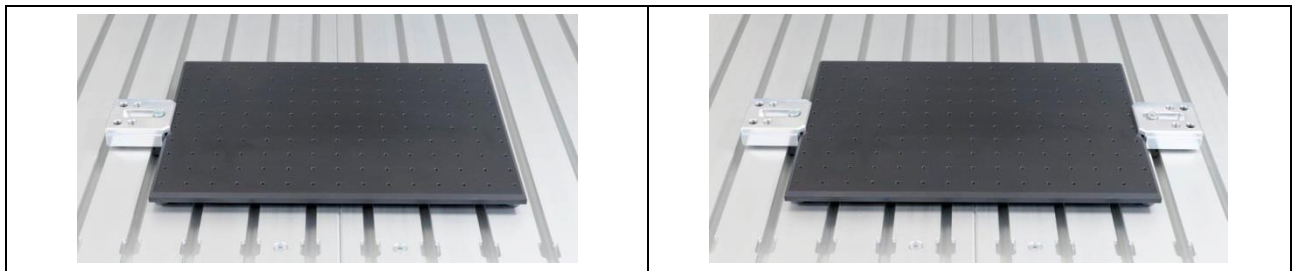


Figure 64: Fastening the UH DUT with the clamping pieces on the T-slot table

Adjust the height and angle with the grub screws as required. Fix the clamping pieces with the hexagon socket screw M6.

After installing the UH DUT universal holder, check that this cannot slip. If necessary, further tighten the screws M8 with care.

16.2.2 Fastening the Circuit Board

Place the circuit board 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).

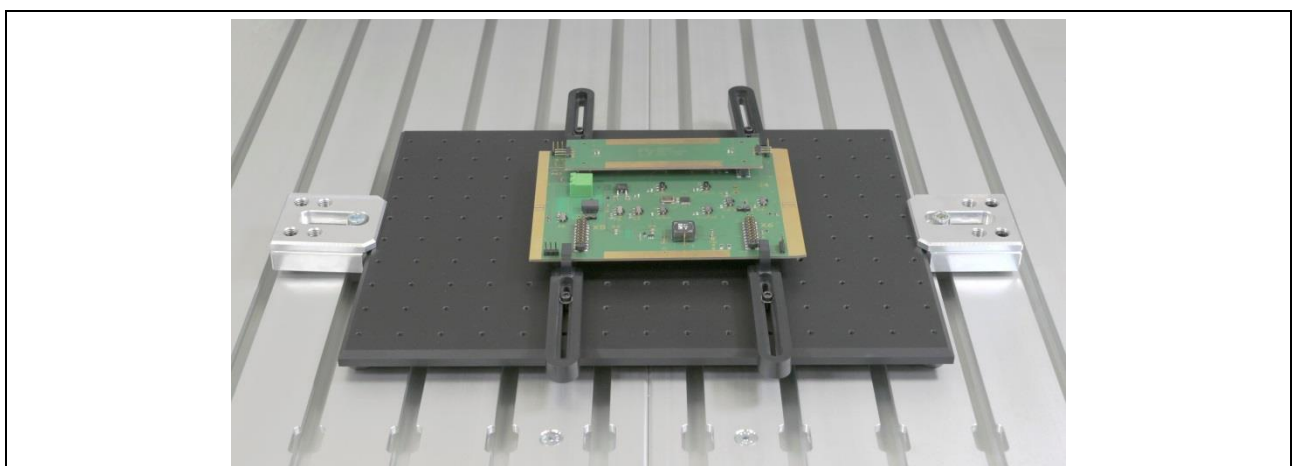


Figure 65: Fastening example with claw 02

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

16.3 Installing the GND 25 Ground Plane for IC Measurements

16.3.1 Installing the GND 25 Holder

First insert and position two T-nuts into the desired T-slot (Figure 66).

Then place the GND 25 holder on the T-slot table above the T-nuts (Figure 67). Insert the countersunk screws M6 (hexagon socket 4 mm, DIN 7991) into the openings of the GND 25 holder one after the other and fasten them with the T-nuts.

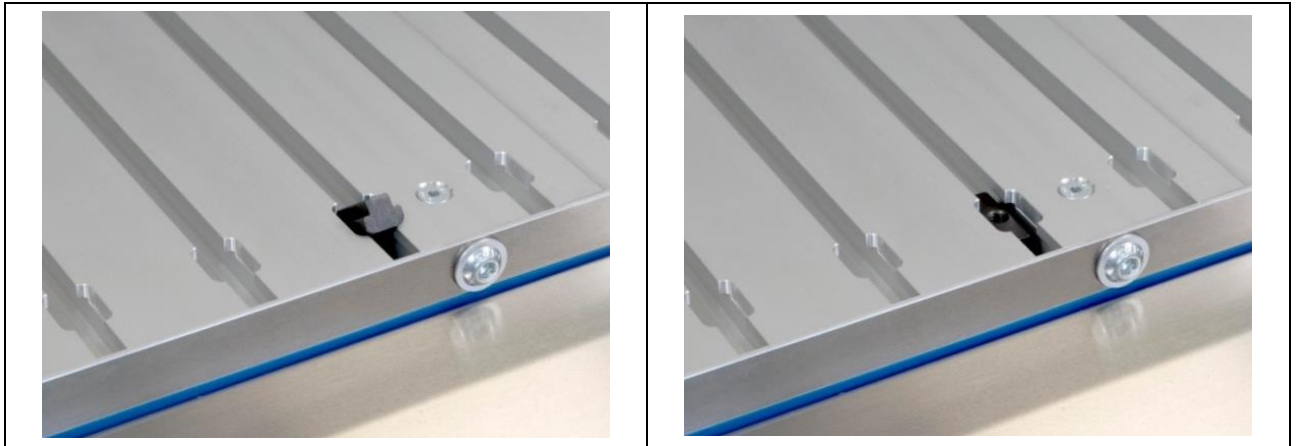


Figure 66: Placing a T-nut in the desired T-slot



Figure 67: Fastening the GND 25 holder

The anti-rotation element can be fastened in one of the four outer holes of the GND 25 holder as required. It ensures that the installed GND 25 ground plane does not turn by accident.



Figure 68: Part of the GND 25 holder with the anti-rotation element

16.3.2 Installing the GND 25 Ground Plane

Place the GND 25 ground plane (Figure 69) 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.

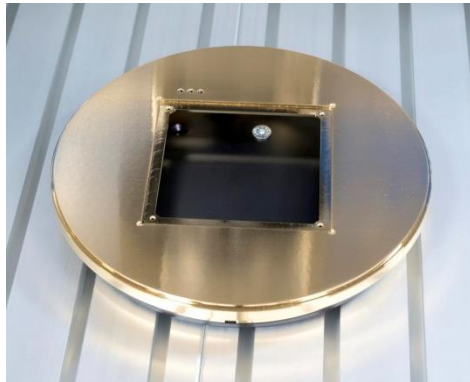


Figure 69: GND 25 ground plane

16.3.3 Safety Instructions for GND 25 Groundplane



Warning!

Danger!

Danger of injury due to falling GND 25 ground plane.



Caution!

Property damage due to falling GND 25 ground plane!

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.

Always remove the GND 25 before transporting the FLS 106 IC scanner.

17 Installing an ICR Near-Field Microprobe

17.1 Safety Instructions for Installing an ICR Near-Field Microprobe



Caution!

The probe tip of the ICR probe is highly sensitive to mechanical stress!

Possible damage due to careless or incorrect handling!

Only remove the protective cap of the ICR near-field microprobe (short: ICR probe) after installation or shortly before measurement.

Avoid touching the probe tip, even with the DUT!

Handle the ICR probe with extreme care at all times.

17.2 Laying the Connecting 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 (see Figure 70).

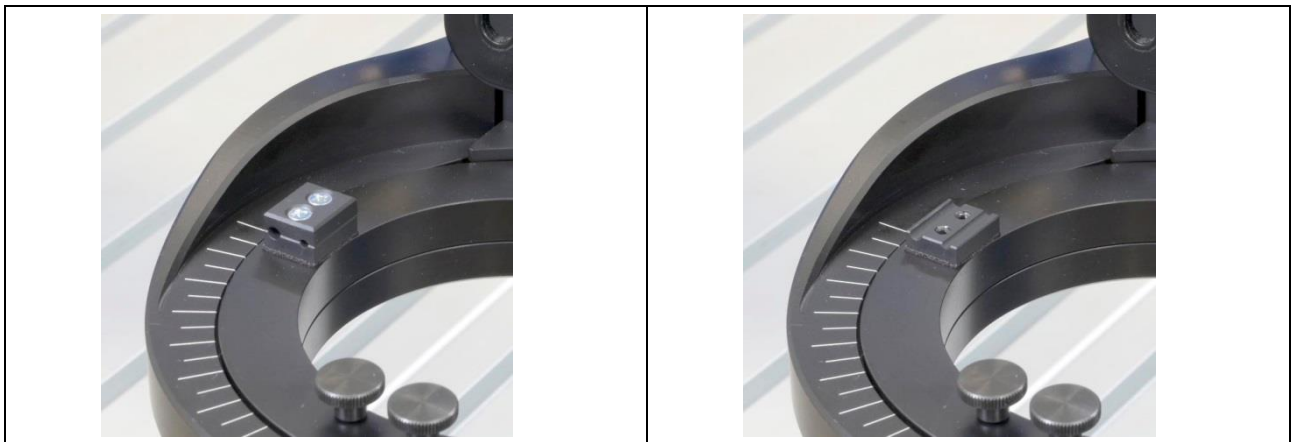


Figure 70: Unscrewing the cable holder

Screw the short SMA-SMA RA measuring cable to the SMA coupling (Figure 71) and then lay it on the rotary ring as shown in Figure 71.

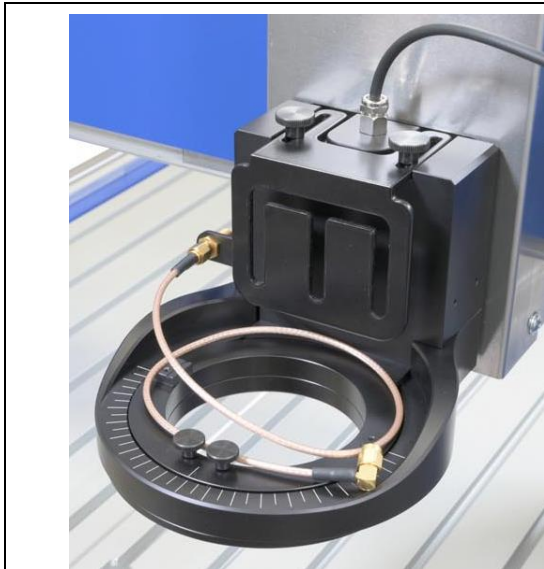


Figure 71: Connecting the SMA-SMA measuring cable



Figure 72: SSMB connector on the rotary unit

Connect the SSMB-SSMB cable to the SSMB connector on the left side of the rotary unit below the SMA coupling (Figure 73) and lay it on the rotary ring as shown in Figure 74.



Figure 73: SSMB-SSMB cable connected

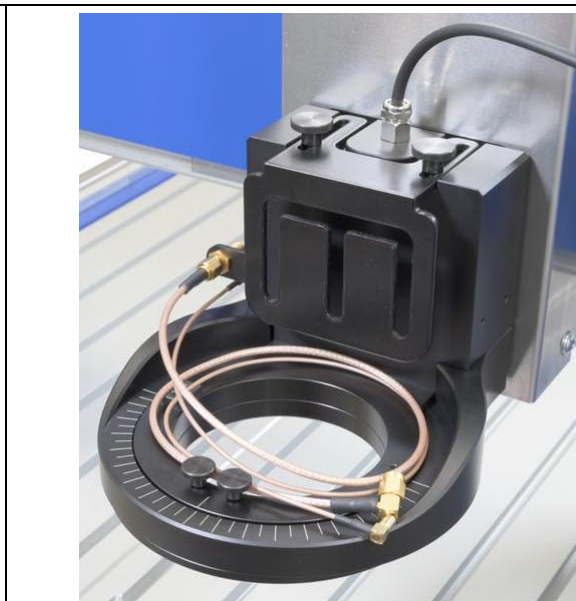


Figure 74: SSMB-SSMB cable on the rotary ring

Now connect the long SMA-SMA RA measuring cable to the SMA coupling (Figure 75).



Figure 75: Connecting the SMA-SMA RA measuring cable to the SMA coupling

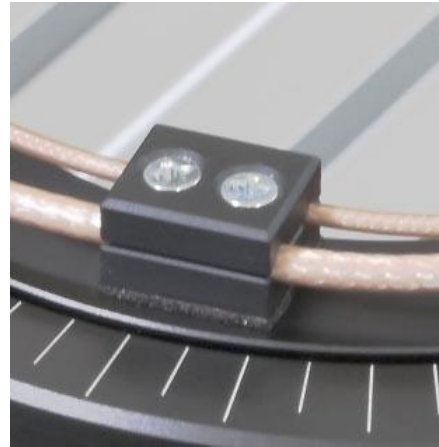


Figure 76: Cable holder on the rotary ring

Place the SMA-SMA cable and SSMB-SSMB cable in the open cable holder, attach the upper half of the holder and fasten with screws (Figure 76). Ensure that there is enough space for the cables so as to be able to turn the rotary ring by 180° in both directions.

17.3 Connecting the ICR Near-Field Microprobe

Important: A prerequisite for the connection of the ICR probe is the correct laying of the cables according to Section 17.2.

Remove the M3 knurled screws from the rotary ring.

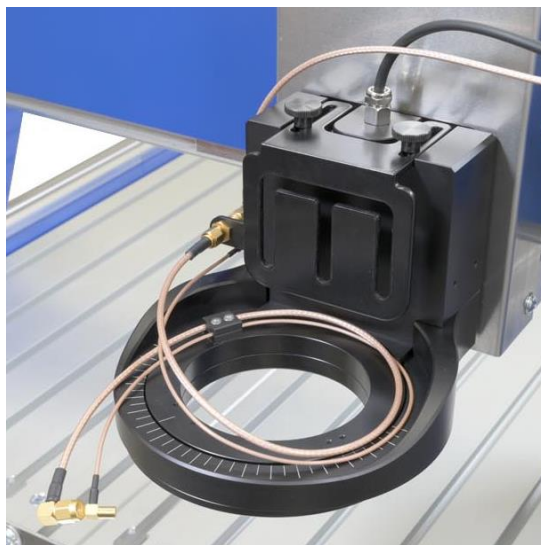


Figure 77: Knurled screws removed from the rotary ring

Next connect the SMA-SMA RA measuring cable to the SMA connector marked *RF out* (Figure 78) and then the SSMB-SSMB cable to the SSMB connector on the ICR probe (Figure 79).

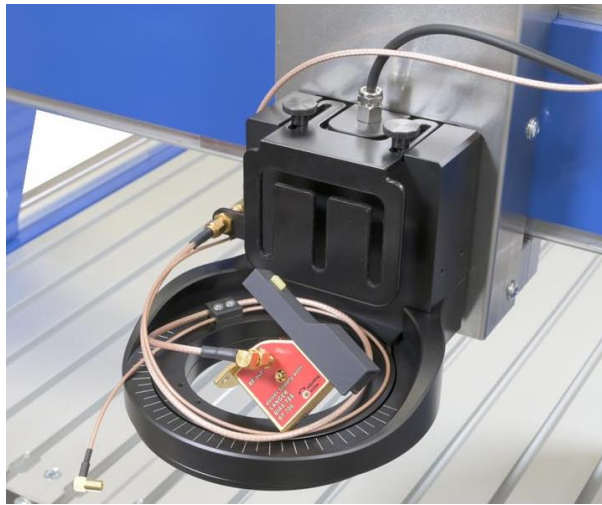


Figure 78: Connecting the SMA cable to the ICR probe

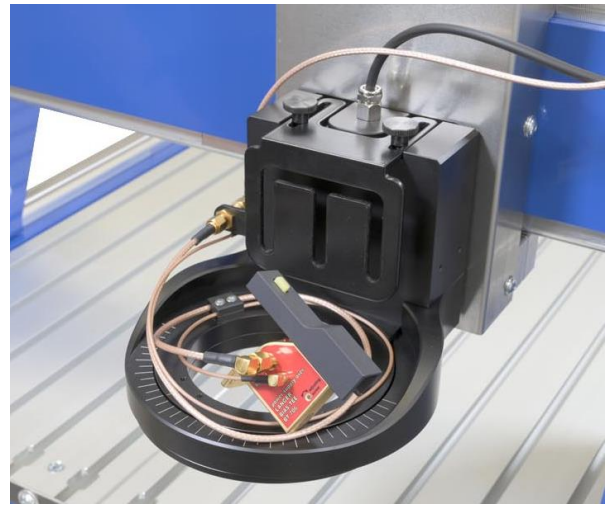


Figure 79: Connecting the SSMB cable to the ICR probe

Now attach the ICR probe to the rotary unit's rotary ring using the M3 knurled screws (Figure 80).

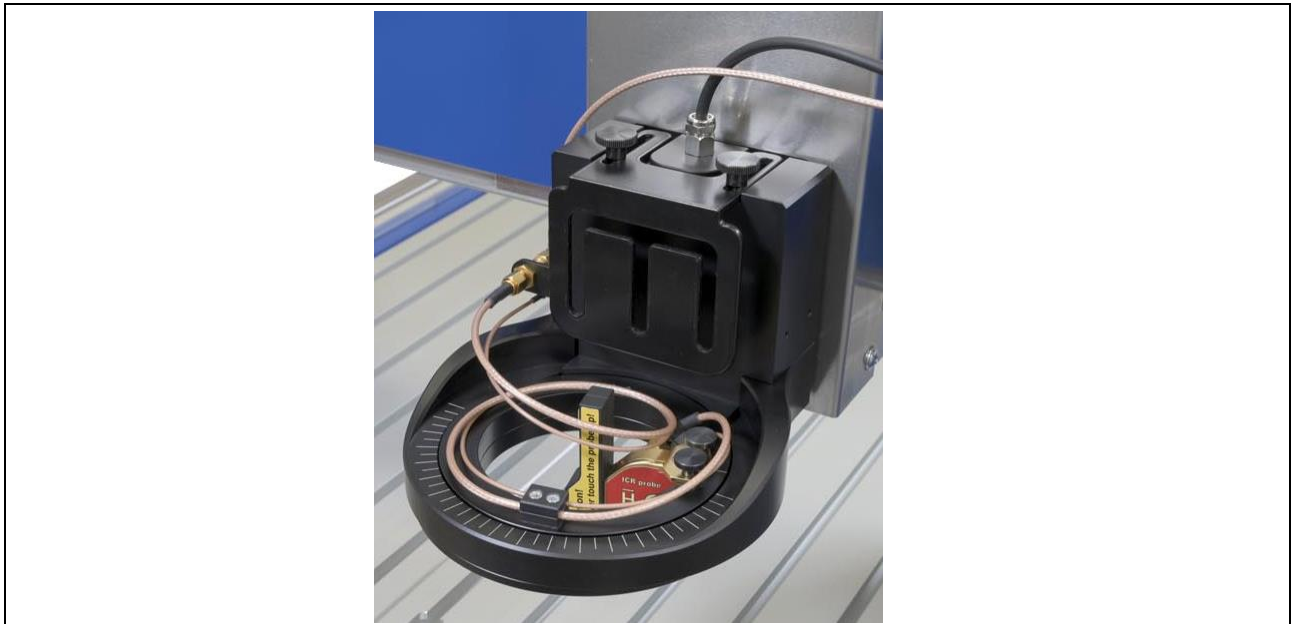


Figure 80: ICR probe mounted with the knurled screws

Note: The protective cap of the ICR probe should be removed only before the measurement.

Press the yellow button on the front of the protective cap to release the protective cap and remove it from above (Figure 82).

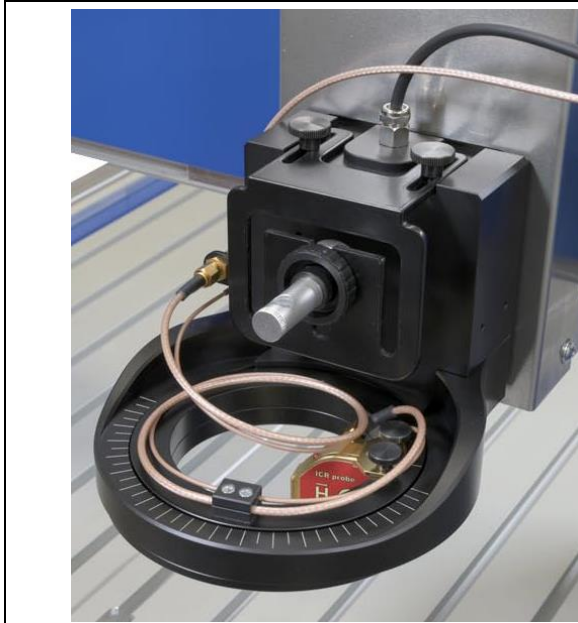


Figure 81: Near-field microprobe installed without protective cap



Figure 82: Protective cap of the ICR near-field probe with lock function

17.4 Installing the BT 706 Bias-Tee

The BT 706 bias-tee (Figure 83) has to be connected upstream to ensure the ICR probe's power supply. To do so, mount the output of the BT 706 bias tee on the *RF in* input of the scanner's Z-axis tower.

Important: Only fasten the bias tee by hand to prevent damage!



Figure 83: BT 706 bias-tee

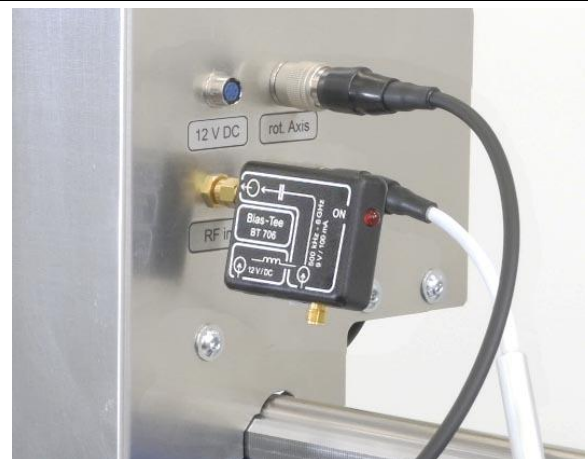


Figure 84: Bias-tee mounted on the scanner ("RF in")

Connect the SMA-SMA RA measuring cable that is connected to the SMA coupling to the SMA input of the BT 706 (Figure 85).

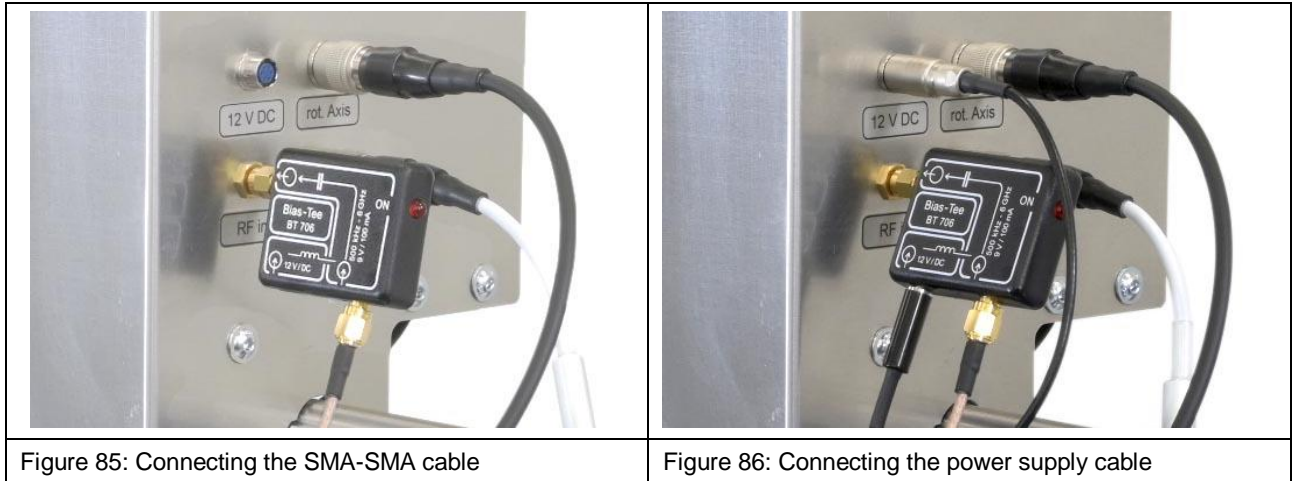


Figure 85: Connecting the SMA-SMA cable

Figure 86: Connecting the power supply cable

Connect the bias tee's power supply cable to the input of the bias tee marked *12 V / DC* and to the connector on the Z-axis tower marked *12 V DC* (HR10 6-pin connector, blue) (Figure 86).

17.5 Collision Control of the ICR Probe

The collision control is a protective function in connection with an ICR probe to limit potential damage that may be caused if the ICR probe accidentally touches the device under test.

The ICR probe may not touch the device under test during operation. The collision control may not be used to position the ICR probe.

The collision control has to be activated in the ChipScan-Scanner software by ticking the *Depth Test* checkbox. This is only possible if the SSMB-SSMB depth-test cable is connected to the SSMB connector of the ICR probe and the SSMB connector on the rotary unit (Figure 73, Figure 80) and the ICR probe's power supply has been established via the BT 706 bias tee.

With the collision control function activated, the rotary unit's downward movement is stopped if the ICR probe tip touches the surface of a DUT, for example.

18 Installing a Near-Field Probe with the SH 01 Probe Holder

18.1 Installing a Near-Field Probe on the FLS 106 IC

First connect one end of the SSMB-SSMB cable to the SSMB connector of the rotary unit and lay the cable on the rotary unit's rotary ring as shown in Figure 87.



Figure 87: SSMB-SSMB cable connected to the rotary unit's connecting plug for collision control

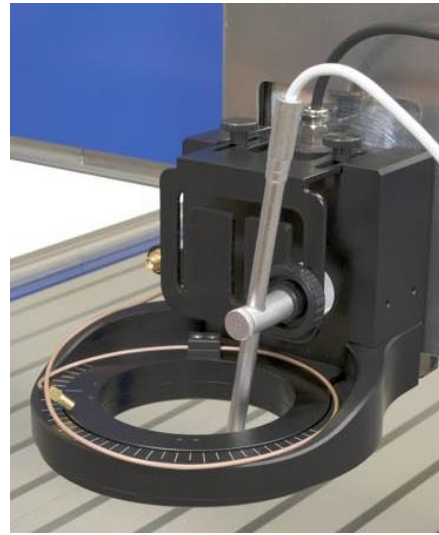


Figure 88: SSMB-SSMB cable properly laid

Now mount the SH 01 probe holder on the rotary unit's rotary ring using the M3 knurled screws (Figure 89).

Connect the free end of the SSMB-SSMB cable to the SSMB connector of the SH 01 probe holder (Figure 90).



Figure 89: SH 01 in the mounted state



Figure 90: SSMB-SSMB cable connected to the SH 01

Now 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 92).

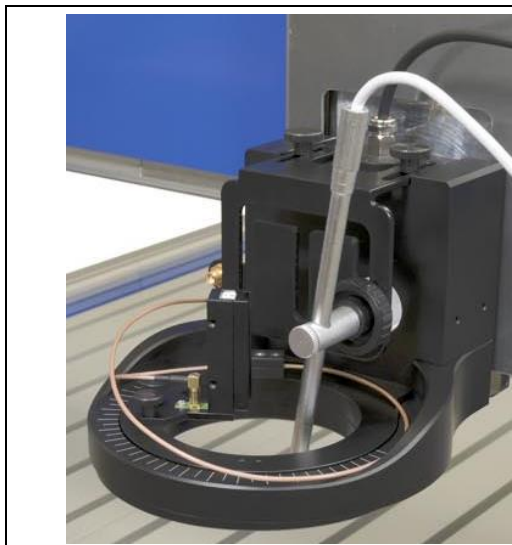


Figure 91: Probe sleeve removed from the magnetic holder

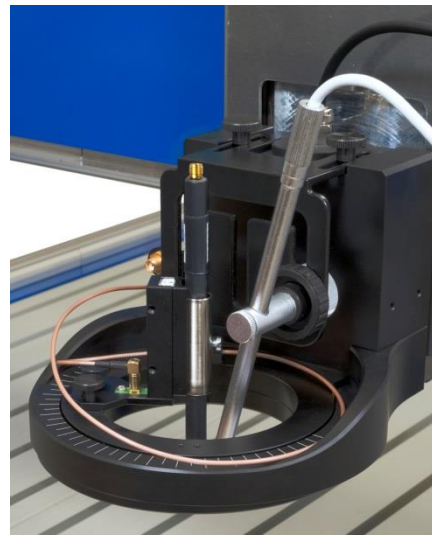


Figure 92: Near-field probe with probe sleeve in the installed state

Note: The probe sleeve can also be removed from the holder as it is held magnetically so as to facilitate assembly (section 10.8). 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.

18.1.1 Connecting a Near-Field Probe Directly to the FLS 106 IC Scanner

If operated without a pre-amplifier, the RF measuring cable has to be connected to the near-field probe's measurement output and directly to *RF in* input on the Z-axis tower (Figure 93).

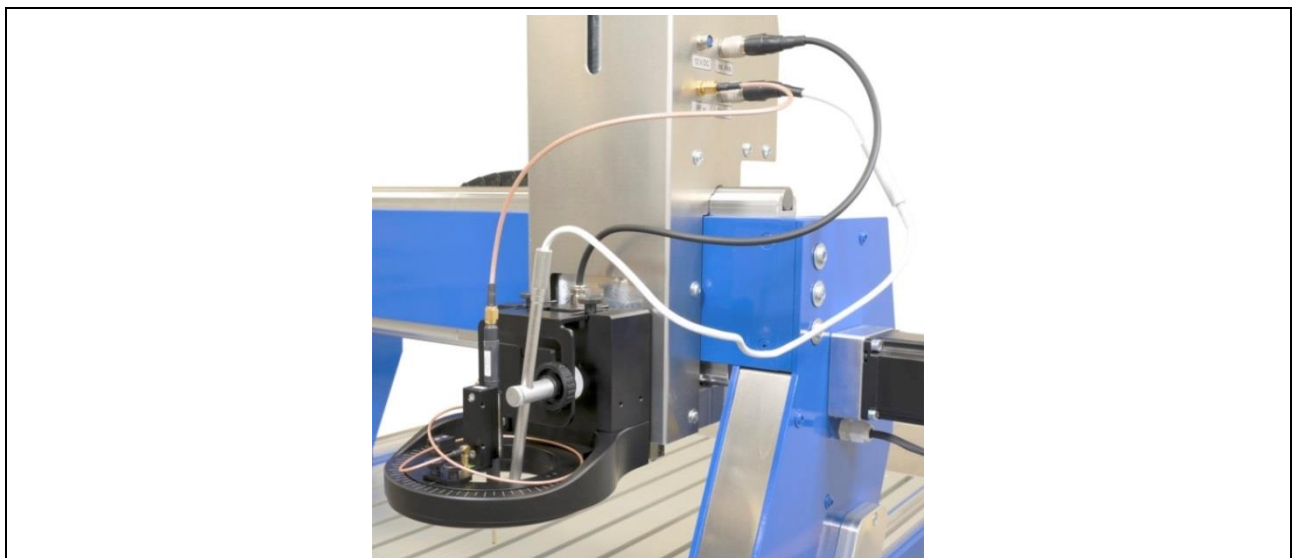


Figure 93: Direct connection of the near-field probe to the scanner

Alternatively, the near-field probe can also be connected to the SMA coupling on the rotary unit. Two RF measuring cables are needed for this purpose. Connect the first RF measuring cable to the probe output (Figure 94) and the SMA coupling (Figure 95) and the second RF measuring cable to the SMA coupling (Figure 96) and the *RF in* connector on the Z-axis tower (Figure 97).

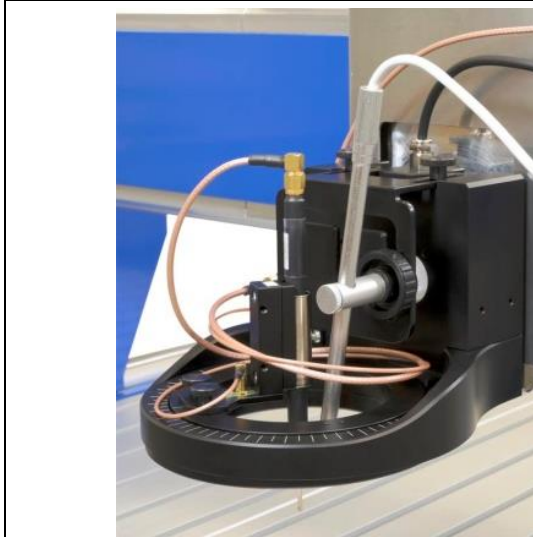


Figure 94: Connecting the RF measuring cable to the near-field probe



Figure 95: Connecting the RF measuring cable to the SMA coupling



Figure 96: SMA-SMA RA cable connected to the SMA coupling

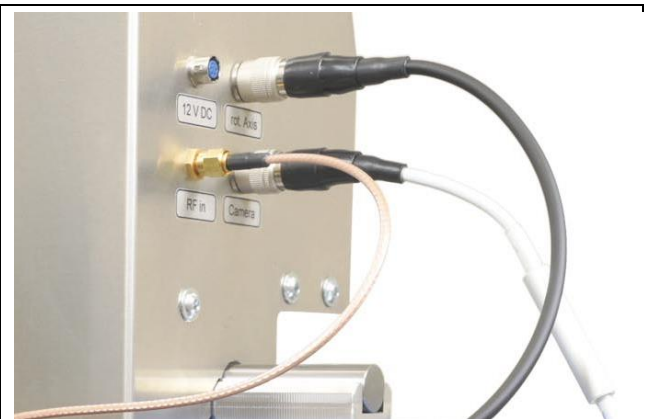


Figure 97: SMA-SMA RA cable on the "RF in" connector on the Z-axis tower

Important: Check that the connected near-field probe moves smoothly in the Z-direction. This ensures that the movement is stopped correctly if a collision occurs. Carefully pull the near-field probe up by hand and check its smooth motion for this purpose.

18.1.2 Connecting a Near-Field Probe with a Preamplicifier

Note: The selection of the correct preamplicifier depends on the measurement task and the near-field probe used. Please contact Langer EMV-Technik GmbH should you have any queries (Chapter 25).

Connect the preamplicifier's SMA output to the input marked *RF in* on the Z-axis tower (Figure 99).



Figure 98: Exemplary preamplifier



Figure 99: Preamplifier connected to the *RF in* input on the Z-axis tower

Connect the near-field probe's RF measuring cable to the preamplifier's SMA input (Figure 100).

Connect the preamplifier's power supply cable to the input of the preamplifier marked *12 V / DC* and to the connector on the Z-axis tower marked *12 V DC* (HR10 6-pin connector, blue) (Figure 101).



Figure 100: RF measuring cable connected to the pre-amplifier



Figure 101: Pre-amplifier power supply cable in the connected state

Important: Check that the connected near-field probe moves smoothly in the Z-direction. This ensures that the movement is stopped correctly if a collision occurs. Carefully pull the near-field probe up by hand and check its smooth motion for this purpose.

18.2 Installing a Near-Field Probe on the FLS 106 PCB

The SH01 probe holder is fixed to the aluminum mounting bracket with the two M3 countersunk-head screws.



Figure 102: Mounting the probe holder on the aluminum mounting bracket

Connect the SSMB plug of the SSMB-HR10 cable to the SSMB connector of the SH 01 probe holder (Figure 103) and connect the HR-10 plug to the connector marked *rot. Axis* on the Z-axis tower (Figure 104).

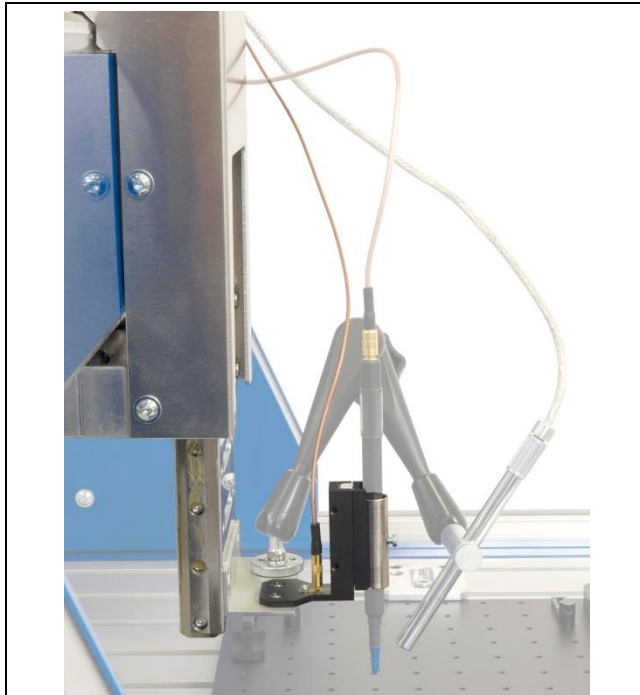


Figure 103: Connecting the SSMB plug to the SH 01



Figure 104: Connecting the HR10 plug to the connector on the Z-axis tower

Next insert the near-field probe into the probe sleeve of the probe holder from above and carefully tighten the screw on the outside of the probe sleeve by hand (Figure 105).

Note: The probe sleeve can also be removed from the magnetic holder to facilitate the assembly of the near-field probe (Section 10.8). Thanks to the rear bore, the probe sleeve can be returned to the magnetic holder and fastened in the correct position.



Figure 105: Mounting the near-field probe on the probe holder

18.2.1 Connecting a Near-Field Probe Directly to the FLS 106 PCB Scanner

If operated without a preamplifier, the RF measuring cable has to be connected to the near-field probe's measurement output and directly to the input marked *RF in* on the Z-axis tower (Figure 106).

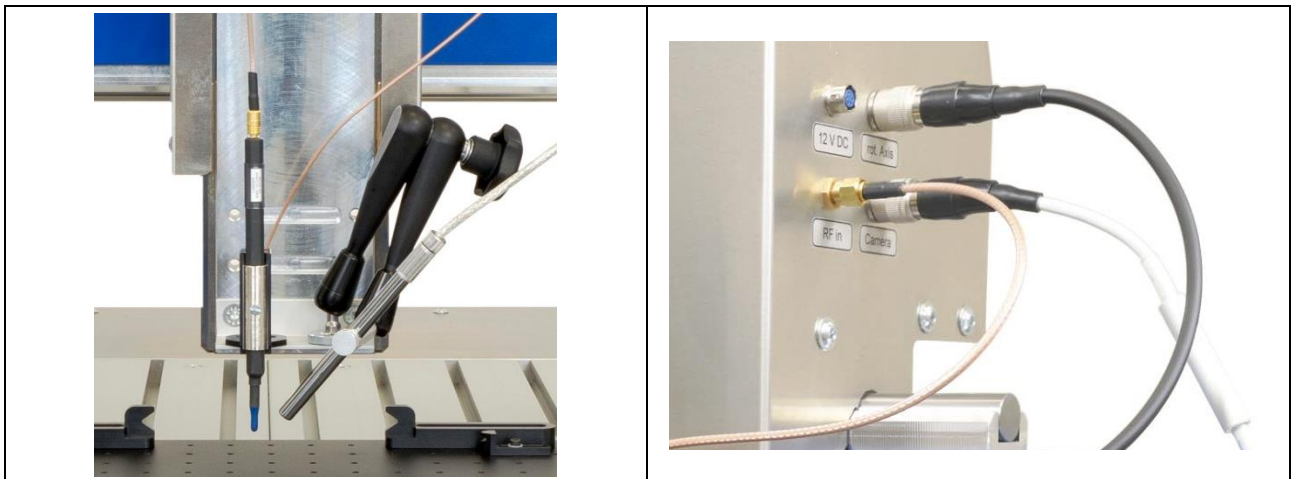


Figure 106: Connecting the respective RF measuring cable to the near-field probe and the "RF in" connector on the Z-axis tower

18.2.2 Connecting a Near-Field Probe with a Preamplifier

Note: The selection of the correct preamplifier depends on the measurement task and the near-field probe used. Please contact Langer EMV-Technik GmbH should you have any queries (Chapter 25).

Connect the preamplifier's SMA output directly to the input marked *RF in* on the Z-axis tower (Figure 107).

Important: Only fasten the preamplifier by hand to prevent damage!



Figure 107: Preamplifier on the input marked *RF in* on the Z-axis tower

Connect the near-field probe's RF measuring cable to the preamplifier's SMA input (Figure 108).

Connect the preamplifier's power supply cable to the connector marked *12 V DC* on the Z-axis tower (Figure 109).



Figure 108: RF measuring cable connected to the preamplifier

Figure 109: Preamplifier power supply cable in the connected state

18.3 Collision Control for the Near-Field Probe

The collision control has to be activated in the ChipScan-Scanner software by ticking the *Depth Test* checkbox.

Function of the collision control:

The probe moves up with the magnetic holder if the probe touches an obstacle when moving down. The scanner recognizes this displacement and stops the movement.

The ChipScan-Scanner software uses this mechanism to carry out the motion strategy called *Volume with vertical collision detection*. Please refer to Section 5.1.3 of the ChipScan-Scanner software user manual for further information.

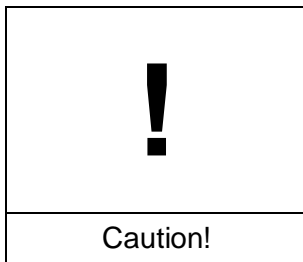
19 Operational Notes

19.1 Checking the Measurement Set-Up before each Use

A visual check of the scanner, components, attachments, measuring devices, DUT and cable guides should be performed before each measurement. Should any damage be discovered, this has to be eliminated before putting the scanner into service. Contact Langer EMV-Technik GmbH should you have any queries (Chapter 25).

19.2 Adjusting the Exact Height of the Probe Tip above the DUT

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



The probe tips – in particular the tips of ICR probes - are highly sensitive to mechanical stress!

Possible damage due to careless or incorrect handling or incorrect scanner adjustments!

Avoid touching the probe tip, even with the DUT!

Carefully observe the distance between DUT and probe tip!

Use appropriate values for downward movements to avoid contact between DUT and probe tip.

The DUT must be aligned parallel to the 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 DUT is very small.

The following instructions will help you make the necessary adjustments:

1. Position the probe at a safe height above the desired location.
2. Place the prism (Figure 110) 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 DUT surface with the DM-CAM. The DM-CAM has to be adjusted so that the vertical distance between the probe tip and DUT can be clearly recognized by means of the prism.
3. 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 DUT with the DM-CAM and readjust the camera's focus as required.
4. The smaller the distance between the probe tip and DUT, the smaller the increment should be. The smallest adjustable increment is 20 µm.

5. 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 under *Settings -> Scanner -> Vertical Motion* for this purpose.

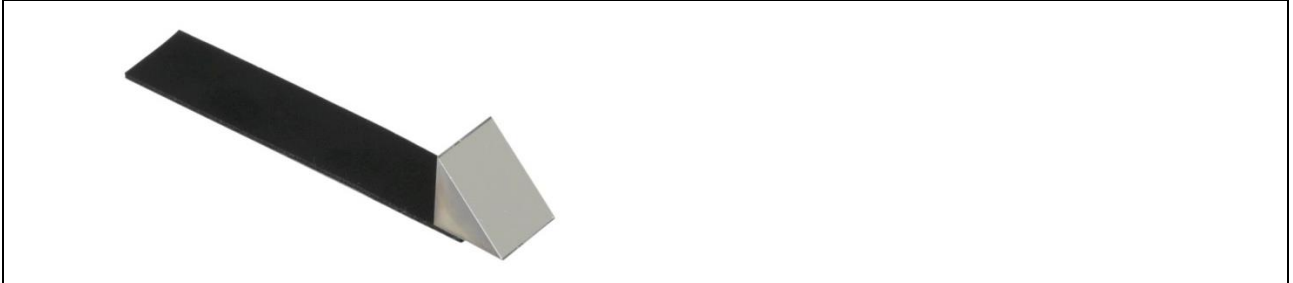


Figure 110: Prism for observation of the vertical distance between probe tip and DUT

19.3 Estimating the Duration of a Measurement with the FLS 106 Scanner

19.3.1 Number of Measuring Points

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

19.3.2 Travel Distance

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

19.3.3 Sweep Time

The larger the *sweep time* of the spectrum analyzer, 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 span to be shown is large and the *resolution bandwidth* is small, it may take several seconds. In addition, the *sweep time* is multiplied by the value set at *Average Count* if *Average* is used.

19.3.4 Transmission Time

The time for the transmission of a measurement curve from the spectrum analyzer to the computer mainly depends on which transmission interface is used. The transmission of a measurement curve with 1000 measuring points only takes a few milliseconds if a GPIB or VXI is used. In contrast, the transmission takes several seconds if the RS232 interface with a small baud rate is used.

19.4 Memory and 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
- vertical resolution of the spectrum analyzer

Note: When using Windows as a 32-bit operating system, no more than 2 GB of RAM storage is assigned to ChipScan-Scanner software.

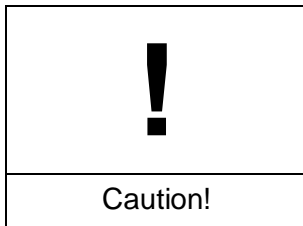
20 After Completing the Measurement

After completion of the scan, the probe 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.

21 Disassembling after Completing the Measurement(s)

21.1 Removing the ICR Probe



Material damage due to lack of protection of the ICR probe!

Before the ICR probe is removed from the rotary unit, the protective cap must be pushed over the probe tip and locked in place. This will prevent damage to the probe tip as far as possible.

Remove the connected ICR probe from the rotary unit's rotary ring by loosening the two M3 knurled screws. 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.

After all cables are removed, you can put the ICR probe in its corresponding case for safe storage.

21.2 Removing the Near-Field Probe

Loosen the installed near-field probe together with the probe sleeve from the SH 01 magnetic holder. If desired, the fastening screw on the probe sleeve can be loosened and the near-field probe can be removed from above.

Disconnect the connected measuring cable and put the near-field probe in its corresponding case for safe storage.

21.3 Removing the SH 01 Probe Holder from the Rotary Unit

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.

21.4 Removing the SH 01 Probe Holder from the Aluminum Bracket

First disconnect the connected SSMB-SSMB cable from the SH 01 probe holder. Then remove the SH 01 from the aluminum bracket by loosening the two M3 countersunk-head screws on the mounting bracket of the SH 01.

21.5 Removing the Preamplifier / 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 on the Z-axis tower by hand. Next unscrew the preamplifier / bias tee from the connector marked *RF in* on the Z-axis tower by hand.

Store the preamplifier / bias tee and the associated cables in the corresponding case.

21.6 Removing a Device Under Test from the T-Slot Table

First loosen all of the clamping pieces (screws M6, hexagon socket 5 mm) and then remove the device under test from the T-slot table.

21.7 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

21.8 Removing the UH DUT

First loosen the clamping pieces (screws M6, hexagon socket 5 mm) and then remove the UH DUT from the T-slot table.

21.9 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. Stow it away safely.

21.10 Removing the GND 25 Holder

Unscrew the two screws M6 (hexagon socket 4 mm) to remove the GND 25 holder. Then raise the GND 25 holder and remove the T-nuts from the T-slot table via the T-slot openings.

21.11 Removing the DM-CAM Microscope Camera

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

Then loosen the small, silver-colored knurled screw and pull the microscope camera out from above.

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

After removing the camera screw, screw the large silver knurled screw back to the black knurled nut and stow away safely.

21.12 Removing the DM-CAM Holder.3 Camera Holder

To remove the DM-CAM holder.3 loose the two M4 knurled screws on the top of the rotary unit. Remove the DM-CAM holder.3, stow away safely and screw the two M4 knurled screws back on the rotary unit.

22 Maintenance

22.1 General Information

The FLS 106 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.

22.2 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 – particularly the sliding rails – with a moist cloth and neutral cleaning agent.	Only if required
Oil the rails and guides.	Before a longer standstill
Grease the ball screws and slide rail of the Z-axis via the lubricating nipples.	Every two years

22.3 Replacing Labels and Signs

The marks, labels and safety signs have been permanently affixed to the 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 25).

23 Dismantling

23.1 General Information

At the end of its service life, the FLS 106 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 scanner has to be properly dismantled and recycled.

Please note that only electrical specialists may work on electronic components and only the respective specialists may dismantle all other components.

23.2 Safety Instructions for Dismantling



Danger due to improper dismantling!

Risk of injury if instructions are not followed!

Read Chapter 23 thoroughly before dismantling.

Only use appropriate tools.

Make sure that cables and electronics are voltage-free.

Make sure that cables and electronics remain voltage-free during dismantling.

Store dismantled components safely and sorted by material properties.

Contact Langer EMV-Technik GmbH in case of uncertainties.

Observe all applicable local health, safety and environmental regulations when dismantling the scanner.

23.3 Procedure of Dismantling

Switch the scanner off and disconnect the mains cable before dismantling.

Recommended sequence:

- (1) Dismantling of attachments
- (2) Dismantling of subassemblies
- (3) Removal of electrical cables, circuit boards and motors

24 Disposal

24.1 Disposal of Packaging Material



Risk of environmental hazards due to improper disposal of packaging materials!

Do not dispose of packaging materials in normal household waste.

Packing materials must be recycled properly.

Dispose of packaging materials separately according to material type.

24.2 Disposal of FLS 106 and Its Components



Risk of environmental hazards due to improper disposal of FLS 106 scanner and its components!

The FLS 106 and its components must be disposed of in accordance with local disposal and environmental protection regulations.

Do not dispose of the FLS 106 and its components in normal household waste.

FLS 106 and its components must be recycled properly.

FLS 106 must be dismantled correctly before disposal (Chapter 23).

Dispose of FLS 106 and its components separately according to material type.

25 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

Contact us at:

Address: 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

26 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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