



**LANGER**  
EMV-Technik

# IC TEST SYSTEM

IC-Scanner  
FLS 106

Operation manual



## Table of contents

<b>1. Measurement setup .....</b>	<b>3</b>
1.1 Safety instructions .....	3
1.1.1 Safety precautions .....	3
1.1.2 Warranty .....	3
1.1.3 Control connector for FLS 106 .....	3
1.1.4 Safety instruction .....	4
1.2 Removal of x- and y-axis delivery protection .....	4
1.3 Setup parts .....	5
1.4 Pictorial connection schematic .....	6
1.5 Mounting of the ICR near-field micro probe .....	7
1.6 Mounting of the hand probe .....	8
<b>2. Software installation.....</b>	<b>9</b>
2.1 General installation requirements .....	9
2.2 Installation of USB to RS232 adapter driver .....	9
2.3 Installation of ChipScan-Scanner .....	9
<b>3. Setting up and commissioning .....</b>	<b>10</b>
<b>4. Operational notes .....</b>	<b>11</b>
4.1 Connecting the IC-Scanner to your PC .....	11
4.2 Placing a probe at a specific distance above a DUT .....	11
4.3 Determine the duration of a measurement with the IC-Scanner .....	11
4.3.1 Moving Distance .....	12
4.3.2 Sweep time .....	12
4.3.3 Transfer time .....	12
4.4 Memory requirements of a measurement .....	12
4.5 Relation between span, resolution bandwidth and points per trace .....	12
<b>5. Technical characteristics.....</b>	<b>13</b>

## 1. Measurement setup

### 1.1 Safety instructions

This product complies with the requirements of the following European Community Directives:  
2004/108/EC (Electromagnetic Compatibility) and 2006/95/EC (Low Voltage)

#### 1.1.1 Safety precautions

The IC-Scanner has been designed for IC measurements with near-field microprobes. Any other use is not permitted.

When using the IC-Scanner please observe the following basic safety instructions to protect yourself against electric shock and the risk of injury:

- read and comply with the operating manual
- keep the operating manual in a safe place for subsequent use
- follow the safety instructions and warnings on the unit
- always perform a visual check of the IC-Scanner before use
- keep hands away from moving and rotating parts
- do not leave the IC-Scanner unsupervised
- read the explanation of the symbols on the unit in the operating manual
- do not switch the IC-Scanner unit on until it has been completely assembled
- do not connect or disconnect any cable while the IC-Scanner is powered on
- damaged connection cables are extremely dangerous

#### 1.1.2 Warranty

We will remedy any faults due to faulty materials or manufacturing during the statutory warranty period at our discretion, either by a repair or the supply of spare parts. The warranty period is subject to the applicable law of the country in which the IC-Scanner was purchased.

#### The warranty is only valid under the following conditions:

- the IC-Scanner and the micro probes have been treated properly
- the operating instructions have been followed
- only genuine spare parts have been used where necessary
- external components (spectrum analyzer, etc.) – separate warranty terms of the relevant manufacturer apply

#### The warranty is forfeited if:

- attempts have been made to repair the IC-Scanner
- the IC-Scanner has been altered
- the IC-Scanner has been used incorrectly

#### 1.1.3 Control connector for FLS 106

##### 1. With robotic enclosure

When setting up the IC-Scanner the EMG control connector needs to be in place. If the system is being used in the European Community, the IC-Scanner must be placed in an enclosure. The enclosure will prevent the operator from entering the IC-Scanners working area and will generate an emergency stop signal if the enclosure's door switch is opened while the IC-Scanner is running. Connect the external start/stop box and door switch or light curtain to the EMG control socket ,ext. Stop' on the back side of the main unit.

## 2. Without robotic enclosure

If an enclosure is not being used, the enclosure door switch can be bypassed by connecting the plug shown on the right side to the 'ext. Stop' socket on the back side of the main unit. Make sure that this is connected before the robotic system has been turned on or you will receive an error message.



### 1.1.4 Safety instruction

#### **1. In order to meet the requirements of the European Community (CE) safety directives, the IC-Scanner must be placed in an enclosure.**

The enclosure will prevent the operator from entering the IC-Scanners work area and will generate an emergency stop signal if the enclosures door switch is opened while the robot is running.

2. Make sure the robot and accessories are connected to a properly grounded power source.
3. Do not connect or disconnect any cable while the IC-Scanner is powered on.
4. Do not drop or spill foreign objects or material such as screws or liquids into the IC-Scanner.
5. Do not touch any moving parts while the IC-Scanner is running.
6. Loading and unloading of parts and material must be done when the IC-Scanner is not running.
7. Changing of fixtures or tooling must be done with the power source disconnected.
8. The IC-Scanner should only be operated in an environment of 0 to 40 degrees centigrade and humidity of 20 to 95 percent with no condensation.
9. Do not store or install the IC-Scanner in an area where it is exposed to direct sunlight.
10. Do not operate the IC-Scanner where electrical noise is present.
11. Only use a neutral detergent for cleaning.

### 1.2 Removal of x- and y-axis delivery protection

The IC-Scanner FLS 106 is delivered with applied grease on its x- and y-axis. Please use several paper towels to remove it from these axis prior to any attempt to move the scanner with the ChipScan software.

### 1.3 Setup parts

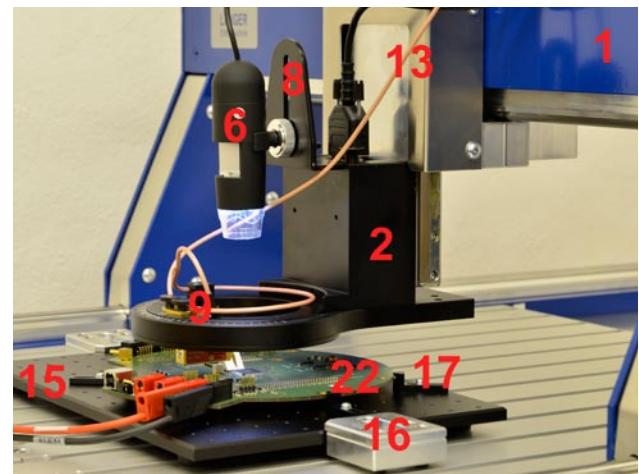
- **Mover system for 3 axes (1) and a 4th rotation axis (2)**

- + Cable for power supply (3)
- + USB cable with 'Hi-Speed USB' (USB 2.0) certification (4)
- + connector ,*Shortened*' (5)



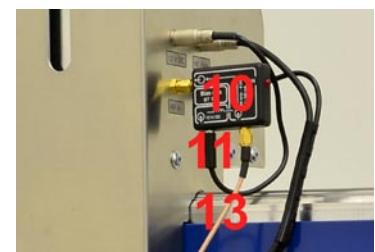
- **Optical control unit**

- + Video Microscope (6)
- + Prism (7)
- + Camera holder mounted on the Mover (8)



- **Probes**

- + ICR microprobe (9)
- + Bias-tee (10) with power cable (11) and 230V power plug
- + documentation
- + 2 measuring cables SMA-SMA (13)



- **Universal holder for DUT (15)**

- + 2 clamps for universal holder with screws (16)
- + 4 black clamps with screws (17)
- + allen keys (18)



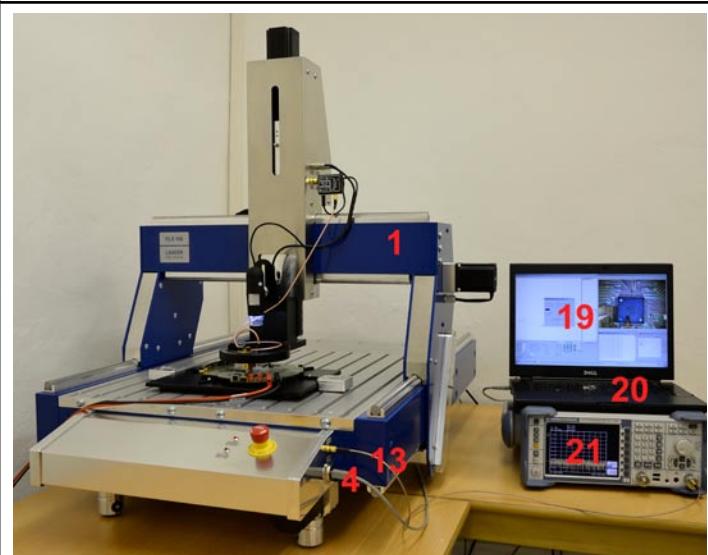
- **ChipScan software (19)**

- + ChipScan installation CD

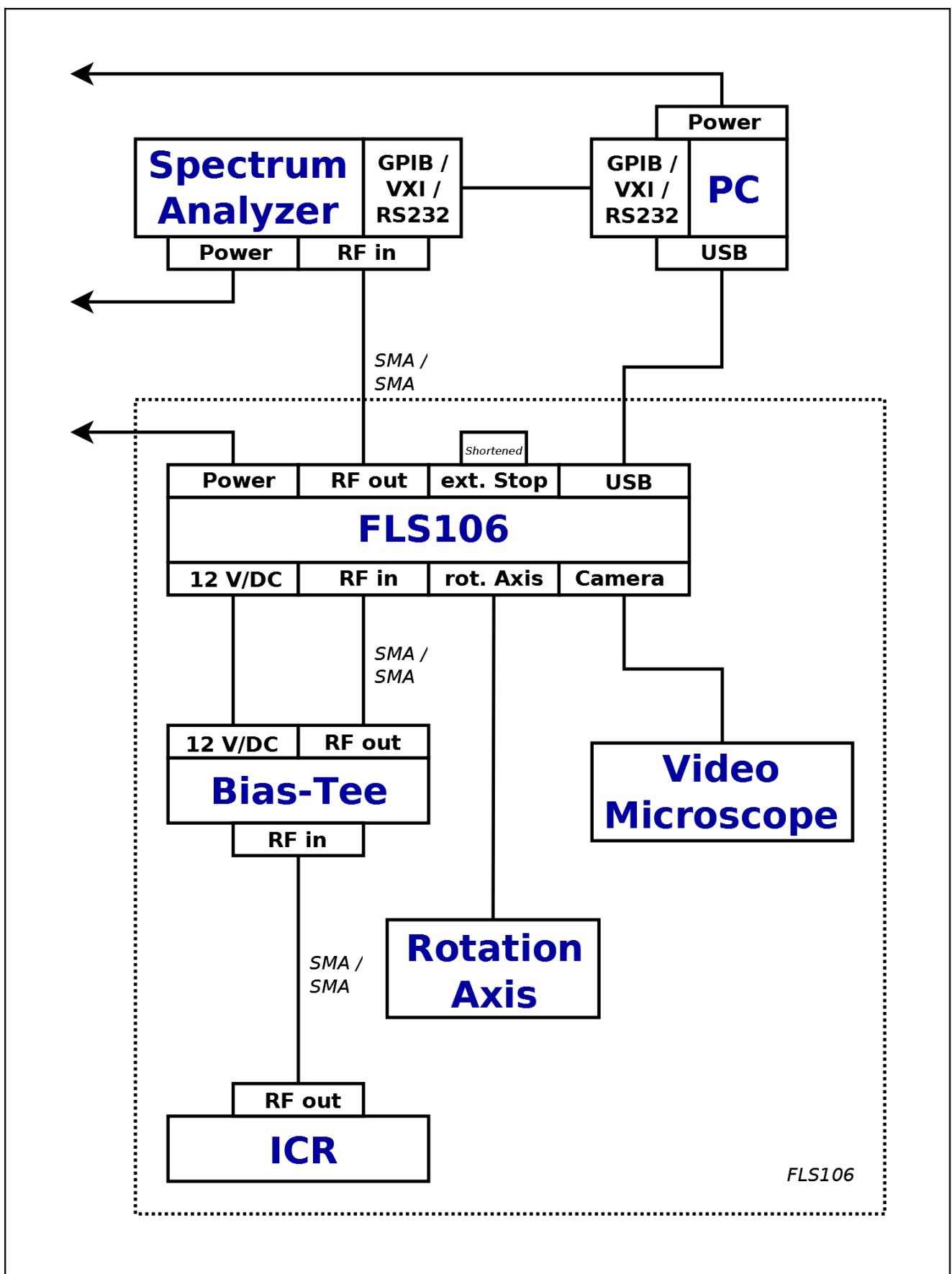
- **PC (20)**

- **Spectrum analyzer (21)**

- **DUT (Device Under Test) (22)**

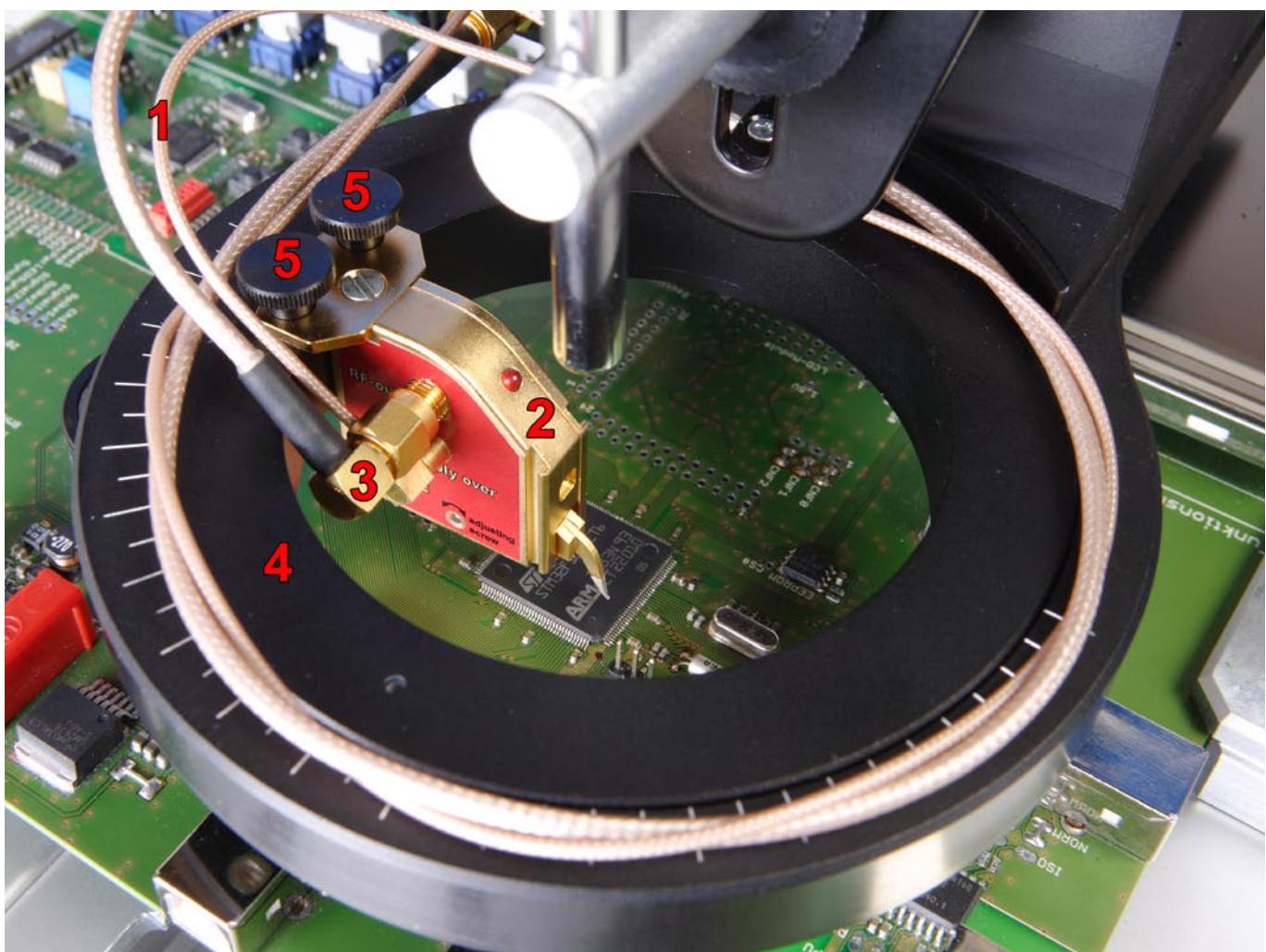


#### 1.4 Pictorial connection schematic



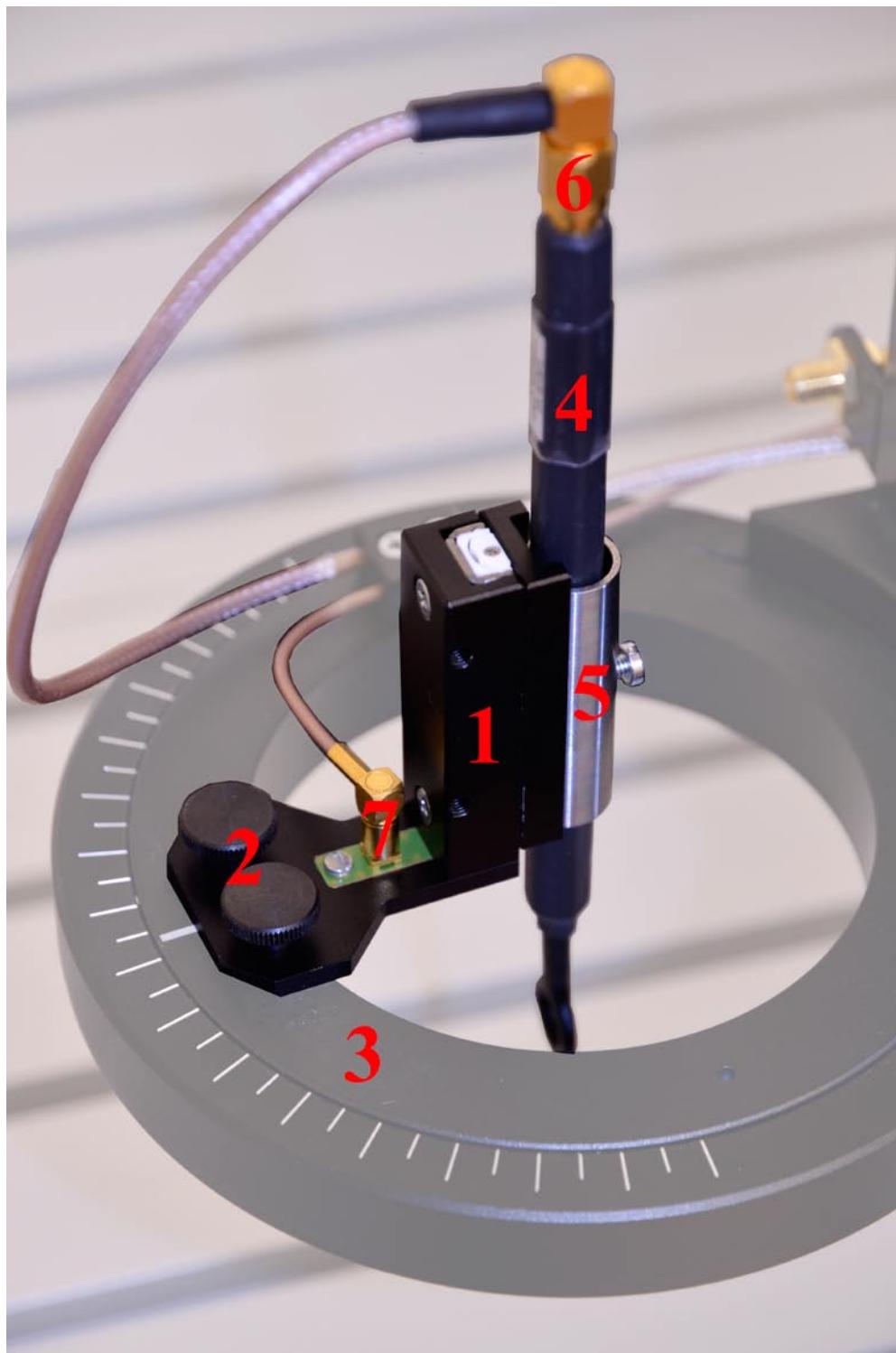
## 1.5 Mounting of the ICR near-field micro probe

1. Attach the depth probe test cable (1) to the ICR near-field micro probe (2) and to the plug of the rotation axis.
2. Attach the measurement cable (3) to the probe.
3. Screw the probe with its protective cap still present to the ring of the rotation axis (4) with the two black finger screws (5).
4. Remove the protective cap of the probe right before you want to start a measurement and reattach it again once you are done measuring to protect the tip of the probe.



## 1.6 Mounting of the hand probe

1. Screw the depth test hand probe holder (1) to the rotation axis (3) with the two black finger screws (2).
2. Insert the hand probe (4) into the depth test hand probe holder part (5) and tighten its screw hand tight.
3. Attach the measurement cable (6) to the hand probe (4).
4. Attach the depth test cable (7) to the depth test hand probe holder (1).



## 2. Software installation

### 2.1 General installation requirements

The setup of the entire system hardware has to be completed first in accordance to chapter 1.

Your computer system should have at least the following properties.

- 1 GB HD space
- CD drive for installation of ChipScan-Scanner
- Windows 7 64-bit (latest service packs)
- Monitor with a display resolution of 1280x1024 or greater
- Spectrum analyzer (for trace acquisition only)

The minimum memory requirements strongly depend on the number and the size of the loaded emission scans, whereas the minimum CPU and GPU requirements strongly depend on the size of the displayed emission scan.

Because of these circumstances we just provide a recommended setup for RAM, CPU and GPU.

- 8 GB of RAM
- CPU Intel Core i7 2.7 GHz
- GPU AMD Radeon 7950 with 3 GB of GDDR5 memory

To start the installation process please insert the enclosed installation CD into your CD drive.

### 2.2 Installation of USB to RS232 adapter driver

Please open the directory *Driver* on the installation CD and execute *USBSerial Driver.exe*.

### 2.3 Installation of ChipScan-Scanner

Please open the directory *ChipScan-Scanner* on the installation CD and execute *ChipScan-Scanner.exe*.

### 3. Setting up and commissioning

Please be sure to have completed chapter 1 and 2 from this manual.

To confirm the proper operation of the IC-Scanner please follow the following steps. Details on specific steps can be found in the ChipScan-Scanner help which can be opened from within ChipScan-Scanner by clicking on the menu *Help* entry *Manual...*

#### 1. Switch on

- IC-Scanner
- PC
- Spectrum analyzer

#### 2. Start ChipScan-Scanner

#### 3. Connect ChipScan-Scanner to the IC-Scanner, Video Microscope and spectrum analyzer

- within ChipScan-Scanner click on the menu *Devices* entry *Device Manager*
- within the Device Manager dialog:
  - to speed up the detection of the IC-Scanner you may do the following in the section *Scanner*:
    - select the COM port the IC-Scanner is connected to in the *RS232* choice box
    - select the *Langer ICS105* in the choice box to speed up its detection
  - press the *Detect Devices* button
  - the device detection takes a little while and afterwards you should find the following in the section *Identified devices used for measurement*:
    - in the *Video Device* choice box *Video Device 1*
    - in the *Scanner* choice box *Langer ICS105*
- to open the Video View click on the menu *Devices* entry *Video View*

#### 4.a Start using the IC-Scanner via the GUI

- calibrate the IC-Scanner by pressing the *Calibrate* button in the ChipScan-Scanner GUI *Graphic Joystick* section

#### 4.b Start using the IC-Scanner via the XMLRPC interface

You may find further details in the ChipScan manual chapter 5. Also you may have a look at the XMLRPC client demo *XMLRPC example client.py* written in the Python programming language in the *Documentation\XML-RPC Python example client* directory on the delivered ChipScan installation CD.

## 4. Operational notes

### 4.1 Connecting the IC-Scanner to your PC

When connecting the IC-Scanner to your PC make sure to use a USB cable which has a 'Hi-Speed USB' certification (USB 2.0) and has a maximum length of 2 meters.

### 4.2 Placing a probe at a specific distance above a DUT

Attention: The following instructions may cause damage to your probe, your DUT or both. Before starting especially make sure to power off your DUT to avoid any short circuit. Also keep in mind the tip of your probe is very fragile. Make sure your DUT surface is evenly and positioned leveled to the surface of the scanner to avoid the probe scratching along the DUTs surface during movements. In any circumstances please proceed with caution.

In many cases it is required to place a probe at a specific distance above your DUT. To accomplish this task complete the steps of following procedure.

1. Power off your DUT.
2. Move the probe over the point of interest while keeping a safe distance to the DUT.
3. Put a prism right next to the point of interest.
4. Use the prism's sloped surface as a mirror to identify the space between the probes' tip and DUT's surface with the Video Microscope.
5. Move down your probe using an appropriate vertical distance.
6. If the vertical distance is not appropriate anymore decrease it, e.g. divide it by ten.
7. Repeat steps 5. and 6. under permanent examination of the probe tip with the Video Microscope until the probe almost touches the DUT's surface.
8. Reduce the vertical moving distance to the minimum of 20 µm.
9. Try to move down your probe, while checking the distance between probe and DUT using the prism and Video Microscope.
10. If the probe is finally touching the surface of your DUT move the probe up for a specific distance.

### 4.3 Determine the duration of a measurement with the IC-Scanner

The duration of a measurement with the IC-Scanner will increase linearly with the number of measurement points. In addition the duration mainly depends on the following three properties:

- \* The time for the movement between two adjacent measurement points.
- \* The time for a full sweep of the spectrum analyzer.
- \* The time to transfer a trace from the spectrum analyzer to your computer.

If you use the 'Save' Action than the time to save the data is added, too.

#### **4.3.1 Moving Distance**

The smaller the distance between two adjacent measurement points, the less time is required for the movement.

#### **4.3.2 Sweep time**

The higher the sweep time, the more time is required for measurement. Keep in mind the sweep time itself may take up a multiple of the time required to move the probe and to transfer the trace. Especially if a wide span and a small resolution bandwidth is used the sweep time may take several seconds. Also if you use 'Average' the sweep time is multiplied by the set 'Average Count'.

#### **4.3.3 Transfer time**

The time to transfer a trace from the spectrum analyzer to your computer mainly depends on the type of transfer interface being used. When using GPIB and VXI the time needed to transfer a trace with 1000 points will be in the range of milliseconds. In contrast if you use the RS232 interface with a low baudrate the transfer time may be in the range of seconds.

### **4.4 Memory requirements of a measurement**

The software used to control the FLS 106 and to acquire measurements is ChipScan. If it is a 32 bit application when using Microsoft Windows as an operating system the maximum amount of system memory an 32 bit application may use is limited to 2 GB. Thus all parts of the software including data and visualization may not exceed this limit.

As a rule of thumb, you can calculate the amount of memory used by a measurement with the following formula:

$$\text{number of bytes} = \text{points per spectrum} * \text{number of measurement points} * 10$$

### **4.5 Relation between span, resolution bandwidth and points per trace**

The amount of points per trace set in the spectrum analyzer limits the frequency resolution. In fact the span is divided by the number of points per trace. At these frequency points the spectrum analyzer will measure a signal using the currently set resolution bandwidth.

For example a signal measured with a very wide span and a small resolution bandwidth might have good signal to noise ratio but will miss several frequency components if the number of points per trace is low. For further information have a look at your spectrum analyzer manual.

## 5. Technical characteristics

### Application:

- Scan the DUTs surface
- Move the E- and H-field probes with high resolution of micrometers

### System component parts:

- 3-axes mover  
(optional  $\alpha$  the 4th rotation axis)
- Software ChipScan
- Universal holder UH-DUT  
(optional for PCB measurement)
- or
- Ground plane  
(optional for IC measurement IEC 61967-3)



### Properties:

The IC-Scanner can be adapted with RF near-field probes and different ICR probes to measure E- and H-near fields.

The probes can be moved above the chip surface in all three axes and can be rotated around the z-axis (optional).

The scanner allows the user to check the position of the probe tip visually through a Video Microscope. The scanner is controlled via PC with the software ChipScan.

Axes	x	y	z	$\alpha$ -rotation
Measuring range	600 mm	400 mm	120 mm	+/- 180°
Accuracy	10 µm	10 µm	10 µm	1°
Repeatability	+/- 20 µm	+/- 20 µm	+/- 20 µm	+/- 1°
Max. speed	50 mm/s	50 mm/s	25 mm/s	90°/s

Control	USB
Supply voltage	110 / 230 V, 0.4 kW
Dimensions / total weight	(1030 x 775 x 990) mm / 75 kg

Software:	<b>ChipScan</b> <ul style="list-style-type: none"> <li>- zero position, manual or script-based probe movement</li> <li>- visualisation of the measuring results in 2D or 3D</li> <li>- output as CSV (Comma Separated Values)</li> </ul>
optional Accessories:	<ul style="list-style-type: none"> <li>- RF near-field probes for E and H-fields</li> <li>- ICR near-field microprobes for E and H-fields</li> <li>- Video Microscope with holder</li> </ul>
Scope of delivery:	<ul style="list-style-type: none"> <li>- IC-Scanner FLS 106</li> <li>- Software ChipScan-Scanner</li> </ul>