



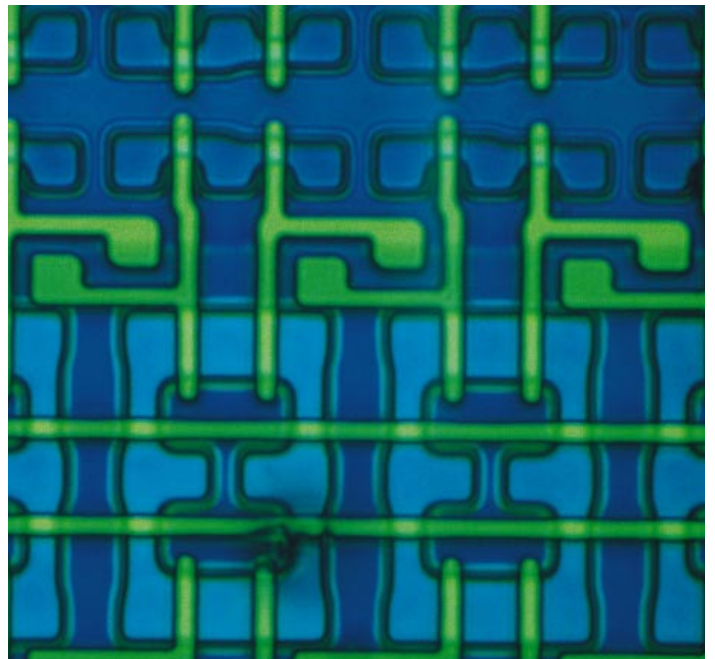
# Leica INM 100

Universal Inspection Microscope for the  
Semiconductor and Microelectronics Industry

*Leica*

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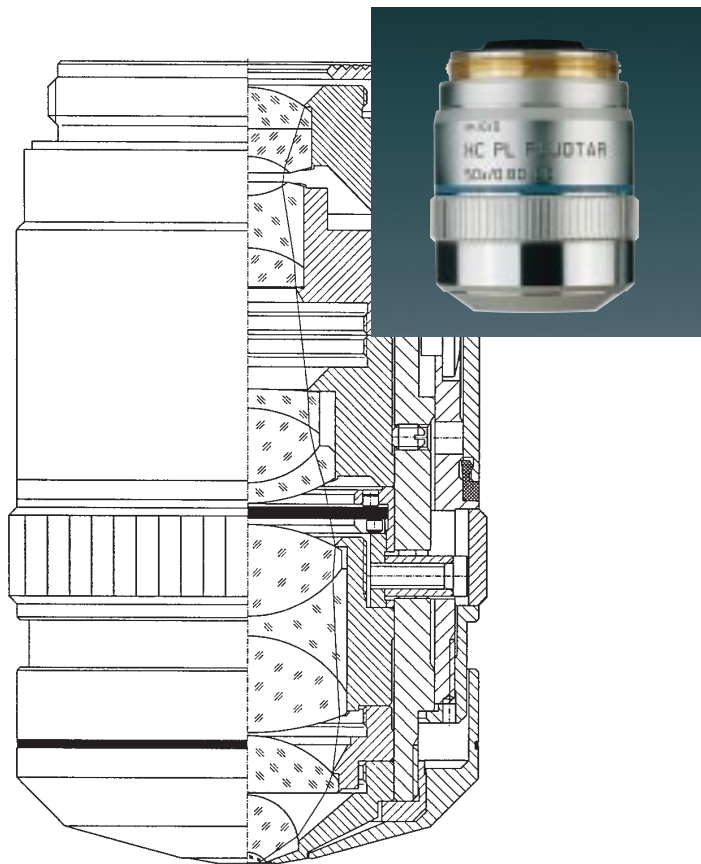
We listened to our customers and converted their requirements into a user-friendly optical imaging system which combines the highest optical performance and cleanliness while providing a maximum of instrument safety and ergonomomy to allow long periods of concentrated work without fatigue. With the INM 100, Leica offers the Semiconductor and Microelectronics industry a new design from the ground-up for a high performance microscope system with optional CONFOCAL MODULE. The key features of the Leica INM 100 are the new Leica HCS optics system, a new standard of ergonomomy, excellent cleanliness as well as simple and fast operation.



Defect in confocal contrast



Leica Design by Christophe Apothéloz



### The new HCS optics concept

With the growing demand for faster chips with persistently increasing memory capabilities, resulting in continuously shrinking structures, microscope manufacturers are facing the ultimate frontier for optical imaging systems with regard to resolution and contrast.

The INM 100 microscope integrates Leica's latest optics concept, the **HCS**. This abbreviation stands for **H**armonic **C**omponent **S**ystem and indicates that all components contributing to performance e.g. objectives, tube lenses, tubes, eyepieces, TV-camera adapters, etc. have been balanced throughout the entire optic system.

The newly designed HC PL FLUOTAR® objectives with semi-apochromatic correction produce an uncompromisingly bright and contrasty image.

The **HCS** features higher numerical apertures, optimized field flatness and reduced astigmatism, using the newly calculated reflected light path and newly developed HCS corrected eyepieces.

### Objectives

In addition to the standard series N PLAN, HC PL FLUOTAR and PLAPO ranging from 1.6x to 250x, the special objective series N PLAN L CORR, PL FLUOTAR L CORR and PL FLUOTAR L with magnifications of 20x, 40x, 50x, 63x and 100x were designed for special semiconductor applications such as masks with pellicles, inspection of bonded chips and LCD inspection. Besides extremely long free working distance, these objectives offer exceptionally high numerical apertures, excellent resolution and outstanding crisp, bright and contrasty images for all illumination techniques. The term "CORR" designates objectives with variable coverglass correction, which are particularly suitable for the inspection of LCDs.

Type	Mag./Aper.	FWD	BF	DF	DIC
N PLAN	2,5 X 0.07		X		-
N PLAN	5x/0.12	14.1	X		A
N PLAN	5x/0.12 BD	14.1	X	X	A
N PLAN	10x/0.25	6.1	X		A
N PLAN	10x/0.25 BD	>6	X	X	A
N PLAN	20x/0.40	1.1	X		D
N PLAN	20x/0.40 BD	1.1	X	X	D
N PLAN	50x/0.75	0.37	X		D
N PLAN	50x/0.75 BD	0.37	X	X	D
N PLAN	100x/0.90	0.27	X		D
N PLAN	100x/0.90 BD	0.30	X	X	D
N PLAN L	20x/0.40 CORR	3.2/1.8	X		C
N PLAN L	40x/0.55 CORR	3.2/1.9	X		C
PL FLUOTAR	1.6x/0.05	1.8	X		-
PL FLUOTAR	2.5x/0.07	9.2	X	X	-
HC PL FLUOTAR	5x/0.15	12.0	X		D1
HC PL FLUOTAR	5x/0.15 BD	12.2	X	X	D1
HC PL FLUOTAR	10x/0.30	11.0	X		D1
HC PL FLUOTAR	10x/0.30 BD	11.0	X	X	D1
HC PL FLUOTAR	20x/0.50	1.27	X		D
HC PL FLUOTAR	20x/0.50 BD	1.27	X	X	D
HC PL FLUOTAR	50x/0.80	0.50	X		D
HC PL FLUOTAR	50x/0.80 BD	0.50	X	X	D
HC PL FLUOTAR	100x/0.90	0.27	X		D
HC PL FLUOTAR	100x/0.90 BD	0.30	X	X	D
PL FLUOTAR L	20x/0.40 BD	>10	X	X	C
PL FLUOTAR L	50x/0.55	8.1	X	X	C
PL FLUOTAR L	50x/0.55 BD	8.1	X	X	C
PL FLUOTAR L	100x/0.75	4.6	X		-
PL FLUOTAR L	63x/0.70 CORR	2.5/1.6	X		C
PL APO	50x/0.85 BD	0.34	X	X	C
PL APO	100x/0.90 BD	0.26	X	X	C
PL APO	150x/0.95	0.20	X		C
PL APO	150x/0.90 BD	0.25	X	X	C
PL APO	250x/0.95	>0.3	X		-

### Ergonomy & User-friendliness

A perfect composition of optics, mechanical features and electronics creates a user-friendly and ergonomic operating environment.

The Leica INM 100 offers hours of fatigue-free, relaxed and comfortable work. Using the ergonomic tube, the operator can individually adjust the viewing angle to obtain the most comfortable position. The layout of the controls is matched to industry standard specifications for ergonomically designed workstations. They are easily accessible for simple, fast and accurate operation.

The optimum contrast achieved with the automatic diaphragm module facilitates assessment of critical structures. Switching between the various imaging modes is ultra fast – by rotating the contrast selection turret, so you gain even more information while saving time. The built-in light adjustment of the 12V 100 W halogen lamp is ergonomically placed at the front of the microscope base.

### Cleanliness

The Leica INM 100 conforms with cleanroom class 1. The streamlined design which has no sharp edges and the use of special non-gassing paints guarantee an optimum contamination free air-flow. All motor driven parts are encapsulated (such as the nosepiece revolver). The transparent contamination shield prevents particles generated by the operator's hands and breath from contaminating the sample.

### Safety of samples

The focus drive has a flexible high-precision mechanical upper endstop. Easily set, it prevents contact between wafer and objective, eliminating the risk of wafer damage.



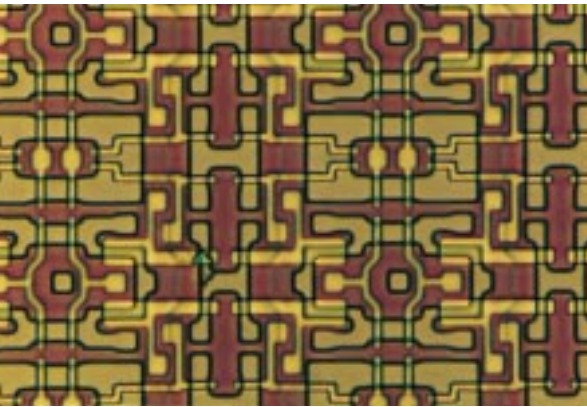
Ergonomic viewing tube



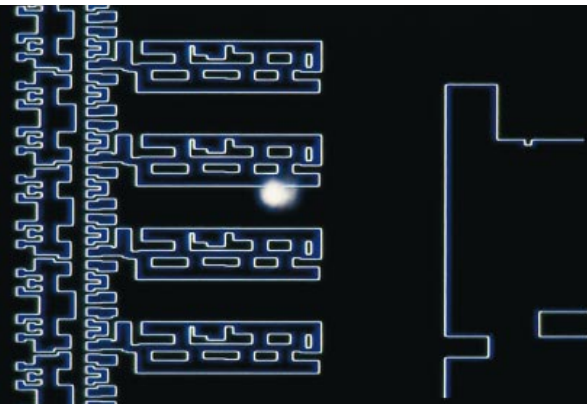
Control unit for magnification selection and aperture setting



Z-drive with upper endstop



Brightfield image



Darkfield image



Confocal image  
(structure identical with brightfield image)

### Contrasting techniques

The use of different imaging modes makes assessment of various problems found in the field of semiconductor manufacturing easier. Typical applications for **Brightfield** are the inspection of shapes of structures, layers and etch quality while **Darkfield** serves the assessment of edge roughness and surface impurities. **Fluorescence** is excellent for the judgment of residual resist and contamination. With the **Interference Contrast Method**, changes in topography or refractive index show up as differences in brightness or color depending on how the system is tuned. The IC-unit of the INM 100 is easy to operate and may be changed instantly to suit the particular problem. Changing of the contrasting method is as easy as rotating a wheel. The built-in 4x contrast turret allows the installation of Brightfield, Darkfield, DIC, Fluorescence and Confocal imaging all at the same time without any compromise.

### Confocal Module

The principle of confocal contrast has been ideally incorporated in the Leica INM 100 in the form of the optional, retrofittable CONFOCAL MODULE. Enhanced contrast, higher resolution and clearly limited depth of field are the benefit of the confocal module. Operation is simple and convenient and requires only a single operation to switch from brightfield to confocal or vice versa. Total magnifications of up to 9000 x provide large format images of submicron details down to 0.2  $\mu\text{m}$ . The INM 100 Confocal Module provides 2 confocal modes and confocal brightfield to compare the images at identical magnifications. The Z-drive system of the INM 100 was specially designed for use with the confocal technique. It comprises a switchable fine focus drive which provides a super fine focusing feeling for the high magnifications.

### **Ergotubes and eyepieces**

Both the Ergotubes FSA-V and FSA-VF have upright, nonreversed images and can be finely adjusted to individual viewing heights and interpupillary distances. The superb imaging quality also encourages long periods of concentration and ensures reliable results.

The new Leica HC PLAN 10x/25 largefield eyepieces produce a sharply defined chrome-free image. The eyepieces have provision for easy graticule insertion.

### **Illumination and light sources**

The Leica INM 100 has a built-in incident and (optional) transmitted light path. The whole illumination system from the lamp to the objective has been optimized to the latest criteria in terms of homogeneity, intensity and chromatic correction, providing the basis for powerful and color neutral illumination. The filter magazine takes up to 4 filters which can be conveniently inserted into the incident light path simply by pushing the individual filter handle.

The INM 100 uses a 12 V 100 W centrable lamphousing for the standard incident light illumination. For confocal and fluorescence illumination HG 100 W or XE 75 W gas discharge lamps are available. The transmitted light option uses a built-in 12 V 20 W halogen lamp which does not require a separate lamphousing. The INM 100 provides a built-in lamp adjustment aid for easy alignment of the incident light sources.

### **Transmitted illumination for transparent objects**

The Leica INM 100 can easily be equipped to examine masks or other transparent objects. The condenser system is prealigned and vertically adjustable. The aperture diaphragm can be individually set.

### **Mirrorhousing 106**

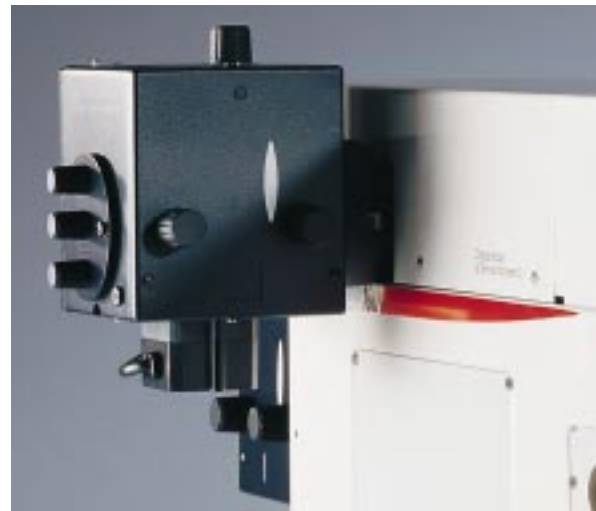
The optional mirrorhousing 106 is available for simultaneous adaptation of a second (e.g. Fluorescence illumination) lamphousing.

### **Stage**

This general-purpose x/y stage can be used in both transmitted and reflected light and has a movement range of 8"x 8". The vacuum mask- or rotatable waferholder ensure safe and reproducible sample insertion.



Ergotube with eyepieces



Mirrorhousing 106



Manual stage 8"x 8"

**Magnification changer**

Optionally an optical secondary magnification system can be used which acts directly on all visual ports in increments of 1.25x and 1.6x. Overall magnification then ranges from 16x to 5000x (> 10,000x with Confocal Module) allowing you to look at the entire chip or concentrate on the frame-filling image of a submicron detail.

**TV-Adaption**

For the adaption of camera systems of all kinds, adapters from 0.35x to 2.4x (fixed and zoom types) with C-Mount and ENG-Mount are available.



C-Mount adapter HC1x

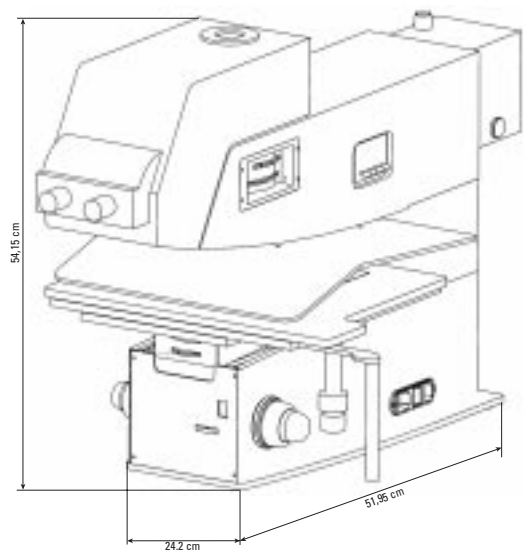


Contamination shown in fluorescence



# Specifications

<b>Purpose</b>	Inspection and quality control
<b>Microscope stand for Incident &amp; Transmitted light</b>	8 Inch stand with built-in transformer for the 12 V 100 W halogen lamp. Motorized objective revolver and programmable aperture diaphragm.
<b>Flexible sample height</b>	Standard = 25 mm Optional flexible intermediate piece = up to 66 mm
<b>Focusing drive</b>	Switchable coaxial coarse and fine focus drive. Z-travel range 25 mm. Coarse focus stroke per rotation = 5 mm. Fine focus stroke per rotation = 0.1 mm. Ultra fine focus stroke per rotation = 0.02 mm.
<b>Revolving nosepiece</b>	Motorized sextuple nosepiece, magnification changeable via built-in keys.
<b>Imaging contrasts</b>	Brightfield, Darkfield, Interference Contrast, Fluorescence and Confocal Contrast selectable via Image Contrast Wheel
<b>Microscope stage</b>	Mechanical stage (205 x 205 mm) with fast positioning handle. The stage has 8" transmitted light capability.
<b>Observation tube</b>	Widefield tilting trinocular tube
<b>Objectives</b>	Ultra high performing HC-objectives. Wide range of objective series. Range of objectives from 1.6 to 250 x.
<b>Magnification</b>	16 x – 4000 x (> 9000 x with the optional confocal module)
<b>Eyepiece</b>	HC-PLAN 10 x/25
<b>Options</b>	Transmitted light outfit, Interference contrast (DIC), Fluorescence outfit, Confocal Module, Magnification Changer
<b>Lamps</b>	12 V 100 W halogen (longlife type 2000 h), HBO 100 (for Confocal and Fluorescence), XE 75 (for Fluorescence)
<b>Power consumption</b>	250 VA
<b>Weight</b>	55 kg
<b>Dimensions</b>	618 x 945 x 550 (W x D x H in mm)



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Leica Microsystems Mission is to be the world's first-choice provider of innovative solutions to our customer's needs for vision, measurement, lithography and analysis of microstructures.

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