

FRAME HS Shadow System

Ultra-fast imaging

Features

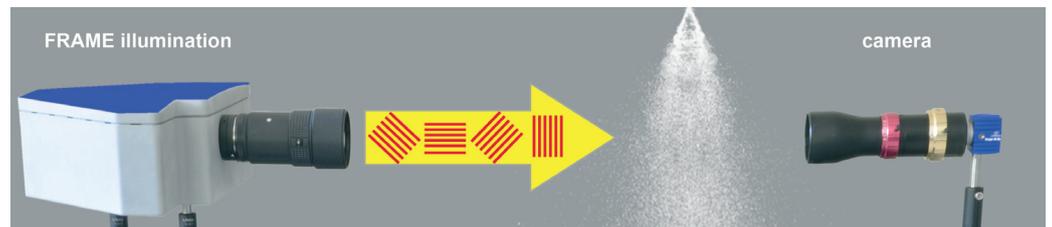
- ▶ ultra-fast imaging of processes like pulsed spray formation and explosions
- ▶ 4 images at 1MHz frame rate on a standard camera
- ▶ simple integrated setup of the **FRAME** illumination

FRAME HS Shadow system

The **FRAME** (Frequency Recognition Algorithm for Multiple Exposures) technique permits a camera to store several images simultaneously in a single exposure on its sensor. The resulting multiply exposed image is reconstructed by using a sorting algorithm, reconstructs the original images and stores each image individually. From one single exposure of the **FRAME**-camera, four images of ultra-short events can be extracted. This novel approach opens up new possibilities in „ultra-fast imaging“ at reduced costs.

The **FRAME** HS Shadow system is fully controlled by LaVision's DaVis software, providing a convenient user interface to generate the illumination timing and camera control. The integrated **FRAME** algorithm reconstructs the image series with a minimum of user interaction.

The **FRAME** HS Shadow system consists of a **FRAME** illumination unit and a high-resolution still camera with a telecentric lens. Illumination and camera are in line-of-sight arrangement for shadowgraphy. The object under investigation will be placed in between the illumination and camera.



FRAME Shadow illumination unit

The time encoded **FRAME** technique is based on a **FRAME** HS Shadow illumination, which projects 4 subsequently encoded images into the measurement region. The **FRAME** illumination comprises of 4 independent light sources, each equipped with a **FRAME** pattern generator to encode the 4 images.



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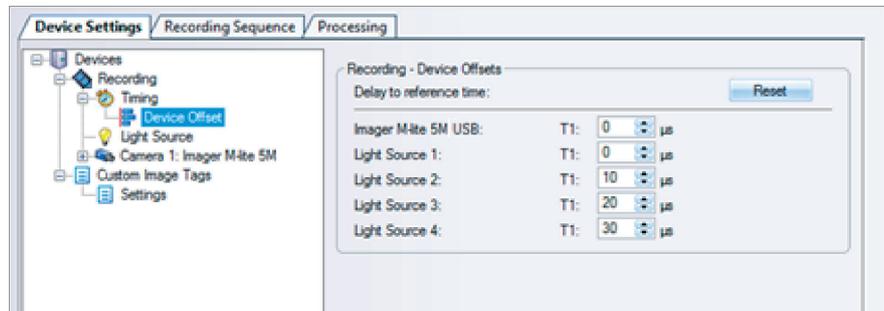
FRAME camera

The high-resolution camera is equipped with a telecentric lens in order to provide a parallel imaging arrangement for best **FRAME** image quality.
The resolution of the reconstructed images is determined by the number of modulation lines used in the illumination unit.



FRAME software

The **FRAME** illumination unit is fully controlled by DaVis. The timing of each exposure can be set precisely and individually and is fully synchronized with the camera.
The **FRAME** system can be synchronized to any triggering event. Repetitive objects (e.g. pulsed sprays) and single events (e.g. shock tubes & explosions) will be captured using the versatile features of the PTU X timing unit under DaVis control.



The DaVis integrated **FRAME** reconstruction algorithm processes the camera images and obtains the image sequence in a single processing step.

Specifications

FRAME HS Shadow Illumination Unit

Min. interframe time	1 μ s
Min. exposure time	1 μ s
Number of channels	4
Illumination lens	180 mm Nikon f-mount
Working distance	50 - 70 cm
Illumination field of view	12 x 12 mm ²
FRAME modulation frequency	40 lines/mm in measurement plane*)
Dimensions	42 x 26 x 13 cm ³ (W x L x H)
Weight	5 kg
Operating temperature	10 to 40°C
Power requirements	100 - 230 VAC

FRAME HS Shadow System

Camera	Imager M-lite 5M*)
Effective spatial FRAME image resolution	500 x 400 pixel*)
Max. repetition speed	50 Hz*)
Camera lens	1:1 telecentric lens
Working distance	10 cm
Depth of field	~1 mm
Field of view	12.5 x 9 mm ² (W x H)*)

*) other camera models and **FRAME** illumination with higher modulation frequency available on request

Ordering information

Part number	Description
1103448	FRAME HS Shadow illumination unit
1105085	FRAME software package
1101503	Imager M-lite 5M camera
1010610	Telecentric lens 1:1, c-mount, WD=10 cm

Data provided by LaVision is believed to be true. However, no responsibility is assumed for possible inaccuracies or omissions. All data are subject to change without notice.

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