



# X-SIGHT 2D DIC

## Optical Measuring System



- ▶ X-Sight 2D DIC comes with camera, lense, multiple lighting options and calibrating grid.

### FEATURES

- Universal solution for inspection of all in-plane deformational effects in engineering
- Ideal for component and material testing
- Adjustable for wide range of applications
- Easily upgradable to 3D DIC system

### SOFTWARE

- X-Sight Alpha DIC®
- Full software capabilities

### SUPPORTED OPERATING SYSTEMS

- Win 11 64bit / Win 10 64bit
- Win Server 2019 / Win Server 2022

Latest Release on date of purchase

## COMPLETE OPTICAL SOLUTION FOR 2D DEFORMATION ANALYSIS

# OVERVIEW

The X-Sight 2D DIC system is a versatile tool for accurate strain and deflection measurements in real-time or post-process. Ideal for validating designs, calculations, and simulations, it excels in evaluating the mechanical properties of machines, assemblies, and structures. With advanced digital image correlation software, X-Sight 2D DIC ensures precise data capture with nanometric resolution and functions as a high-performance video extensometer with single or multiple cameras. Its postprocessing capabilities enable easy reassessment of stored data. Combining accuracy with adaptability, the X-Sight 2D DIC system is also upgradeable to the X-Sight 3D DIC system.

## MODELS

Unlock precision tailored to your needs with the X-Sight 2D DIC system, available in four standard camera configurations. Whether it's about resolution, measurement area, or sampling rate, we've got you covered. The numeric value at the end of the model designation indicates the camera resolution in megapixels.

**XS-DIC3 2D-M5**   **XS-DIC2D-M16**   **XS-DIC2D-M24**   **XS-DIC2D-M67**

The system can also be customized through the selection of a specific camera, lens, and auxiliary hardware to suit your experiment the best.

## MEASURING AREA

Measuring area sets the achievable resolution of the DIC system. The smaller the area, the better the resolution, and vice versa.

The optical system does not have any maximum or minimum measuring area, as this value depends on the optical hardware used for the particular experiment. Therefore, the following chart shows the field of view size equivalent to 1 micron resolution.

Model Designation	Measurement Area at 1 micron resolution [mm]	Measurement Area at 1 mils resolution [mm]
XS-DIC2D-M5	300	7 800
XS-DIC2D-M16	650	16 800
XS-DIC2D-M24	650	16 800
XS-DIC2D-M67	1 000	26 000

## WORKING DISTANCE

The working distance, which is the distance from the camera to the measured object, forms a relationship with the measuring area and the focal length of the lens. By selecting any two of these values, the third is automatically determined.

The following table presumes a 1-micron resolution and use of default supplied lenses and is, therefore, illustrative:

Model Designation (at 1 μm resolution)	Typical Lenses used	Working distance [mm]
XS-DIC2D-M5	S16	550
XS-DIC2D-M16	H16	725
XS-DIC2D-M24	H16	725
XS-DIC2D-M67	XH16	715

Use the Field of View & Working Distance charts at the end of the datasheet for more specific values.

## SAMPLING RATE

The sampling rate depends on the camera resolution and throughput of the bus used to transfer the images to the PC. The frame rate of each system can be increased by reducing the image size.

The chart below displays sampling rates for some common image resolutions. For the Maximal Sampling Rate<sup>1)</sup> column, a 128 px image height is assumed. The Full HD<sup>2)</sup> corresponds to 1920 x 1080 px, and the VGA<sup>3)</sup> to 640 x 480 px. Be aware that the image can be cropped according to specific needs.

Model Designation	Frame Rate at Full Image [Hz]	Maximal Frame rate [Hz] <sup>1)</sup>	Frame rate at full HD [Hz] <sup>2)</sup>	Frame rate at full VGA [Hz] <sup>3)</sup>
XS-DIC2D-M5	75	200	150	200
XS-DIC2D-M16	23	280	57	115
XS-DIC2D-M24	15	230	47	94
XS-DIC2D-M67	31	1 170	528	164

<sup>1)</sup>For the Maximal Sampling Rate column, a 128 px image height is assumed

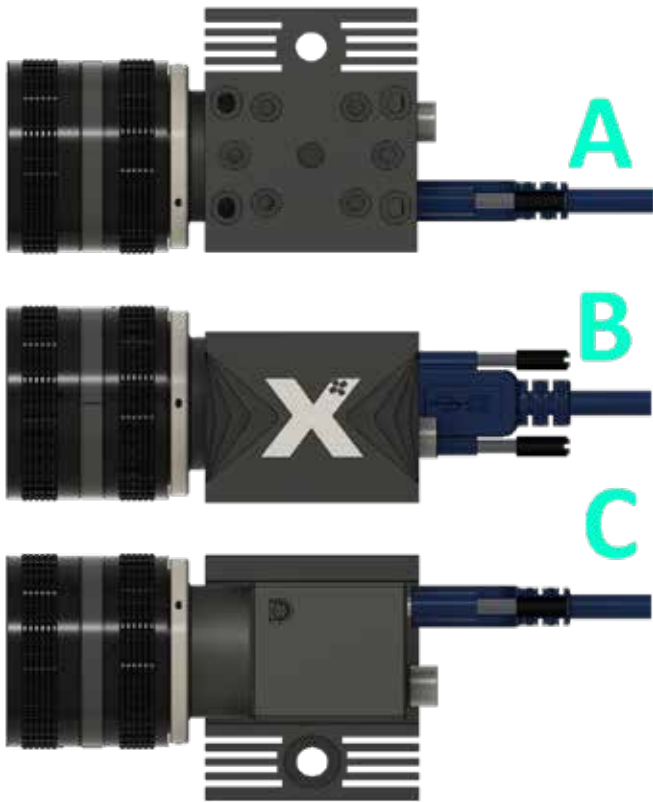
<sup>2)</sup>The Full HD resolution corresponds to 1 920 x 1 080 px

<sup>3)</sup>The VGA resolution corresponds to 640 x 480 px

\*The resolution of the camera sensor is smaller than Full HD designation

## MECHANICAL INTERFACE

Cameras are mounted in a passive aluminum cooler either in a portrait or landscape orientation. The cooler serves as a part of thermal management and a mechanical interface at the same time and has two mounting options. Either a 1/4UNC threaded hole (center hole in View A) for use with mounting arm (further described in lighting options section). Standard interface is that the camera is attached to a tripod ball head with a tripod using a quick-release fixing plate. Both the ball head and tripod are part of the system.



▲ Camera/Cooler interface

Interface is also possible a through hole designed for M6 screws (hole between the ribs visible in view A, C) using a T-slot nut to attach the camera to a 3D bar (3D Bar is not part of 2D DIC set, and is only applicable in this system via 3D Expansion kit or in standard 3D DIC System).



▲ Tripod with a tripod ball head



## LIGHTING OPTIONS

The X-Sight 2D system comes with two light sources in total. One BLED which is a battery-powered light, and the other LED light is powered by an electrical grid and have higher light intensity.



▲ BLED Light

A BLED is to be used for field measurements, measurements of smaller objects, or to light up hard-to-reach places. It can also be used as an addition to stronger lighting sources for proper light distribution on measurement surface.

Note: LED lights have power bank capabilities for easier.

Parameter	Value
Light temperature	3 200 - 5 600 K
Intensity	1 350 lm on 1 m <sup>2</sup>
Power	10W
Power source	Battery/Charger
Batter Capacity	4 200 mAh

For medium-sized applications, multiple light sources should be considered.



High-intensity ▲ LED lighting

Parameter	Value
Light temperature	3 200 K
Intensity	4 860 lm on 1 m <sup>2</sup>
Power	54W
Power source	Electrical Grid
Batter Capacity	4 200 mAh

The lights are typically mounted on the 2D bar using a mounting arm (MARM). The MARM has 1/4UNC threaded ends. Its spherical joints allow for the flexible positioning of the light source. Each system is equipped with a pair of MARM with a crab clamp.



▲ MARM with a crab clamp

For large fields of view, a custom solution is applied. In many cases, separate light stands are used.

## PC CONNECTION

According to the DIC system model, the camera are connected to the measuring computer either via USB 3.0 (all besides M67) or 10GigE (M67) bus. Usage of a dedicated PCIe USB 3.0 card or a Thunderbolt in the measuring PC is recommended to secure a stable connection. Connection via USB Hub could make the frame rates listed in the Sampling Rate table unachievable.

USB camera cables are supplied in standard 4.6m length and can be extended via active optical extenders (not included).

## MEASURED DATA TRANSFER (I/O)

Every X-Sight DIC System is equipped with an AD/DA converter. This device has two single-ended  $\pm 10V$  output channels and eight single-ended or four differential input channels.

Multiple ways exist to **OUTPUT** the measured data to the machine control unit or the testing machine software.

- **Digital**  
DOLI Binary, MODBUS, HP VIDEO, TCP/IP, RS232
- **API**  
Alpha API (JSON), MRT API
- **Analog**  
Auxiliary AD/DA converters
- **Pulse Incremental**  
Quadrature encoder-like pulse communication with the use of a **PULSEGEN** device

**INPUT** of external data to X-Sight Alpha software (force, temperature, pressure) is also possible.

The API communication allows the DIC System to operate remotely. This feature includes commands like Start/Stop, Method Switch, Set Gauge Length, and others. For more info, check out the **Communication Options** document.

## POWER CONNECTION

The high-intensity lights are powered by a single 120 W AC adapter providing 24 VDC output. A Y-splitter is used to supply both lights at the same time.

The battery power lights can be charged via a USB-C or a micro USB cable. A pair of USB cables with a dual-port charger are included in each system.

Cameras are powered by the PC by USB cables, with the exception of the M67 configuration, for which a Power over Ethernet or 10 - 36 VDC external power source is required.

## OPERATION CONDITIONS

The X-Sight 2D DIC system is designed for indoor use, but outdoor applications under supervision are permissible. Do not allow the unit to get wet.

Conditions	Permissible value
Temperature	5-40 °C
Humidity	30-70 %

The system allows measurement through the glass or the use of a mirror. In such cases, these optical elements must be of a high optical quality so as not to introduce unwanted disturbance to the measurement.

When measuring through the glass, a polarization set may be required to reduce/eliminate the light reflections.

When measuring with a climatic chamber, be aware that the vibrations and heat turbulence may introduce a raised noise base to your signal.

This equipment is compatible with Class A of CISPR32. In a residential environment, this equipment may cause radio interference.

This product complies with EU Directive 2002/96/EC.



## PACKAGE CONTENTS

Each X-Sight 2D DIC system is supplied in a dust-proof case containing, except for the PC, everything needed to start the measurement.

The outer dimensions of the case are 687 × 528 × 366 mm, with a weight of approximately 15 kg.



◀ XS - 2D DIC dustproof case

Note: The above-depicted case is an illustration of a standard configuration; the content of the case may vary based on the customer's needs.

Item	No. of pieces
Dust-proof Case	1
Camera	2
Lens	2
Battery-powered LED	2
High-intensity LED	2
MARM + crab clamp	2
Tripod + Head	1
3D Bar	1
Power Supply for lights	1
Camera Data Cable	2
Synchronization Cable	1
Calibration Grid	3
AD/DA Converter	1
Plastic angle kit	1
6 + 2.5 mm Allen key	1
Lens cleaning cloth	1
Quad-port USB 3.0 hub	1
Installation USB	1
USB License Key	1

The measurements with the X-Sight 3D DIC system are primarily performed post-processing on surface elements with many possible inputs of scalar values. In post-processing, the number of line-based probes can be multiplied or switched for an area strain or displacement mapping function.

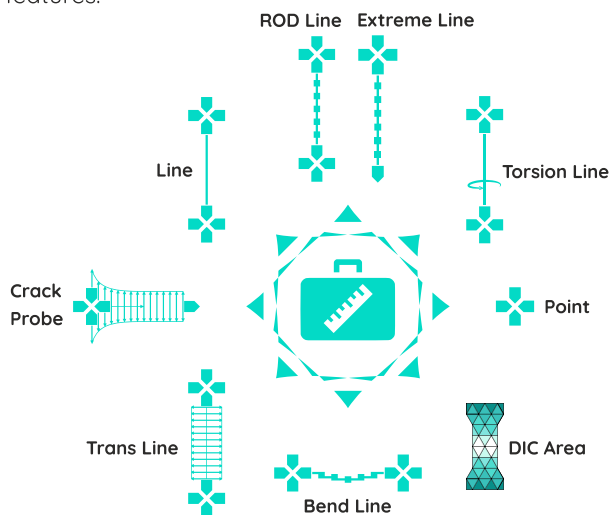
The X-Sight 3D DIC system is capable of measuring in a Real-time fashion and outputting selected values to 3RD party software or devices.

## LICENSING

The 3D DIC system comes with a perpetual X-Sight Alpha DIC software license bonded to a HW USB dongle. This allows the user to install the software on unlimited computers and use only the one where the license key is plugged in. This way of licensing makes it easy to switch the computer in case of a PC breakdown. Alternatively, a network license is available upon request, which allows the software to be used on multiple devices within the same network without the need for physical key transfers.

## MODULARITY AND PROBES

The X-Sight Alpha DIC software is split into several modules. Modules group different measuring probes or advanced features.



The standard X-Sight 2D DIC system includes all the software modules except 3D Stereoscopic and 3D Planar functionalities.

Software Module	Point	Anchor Point	Line	Extreme Line	Trans Line	Bend Line	Torsion Line	Crack Probe	ROD Line	DIC Area
AX	•	•	•	•						
TR					•	•				
TO							•			
CR								•		
ITT									•	
DIC*										•
PP	Post-processing of recorded measurements (different probes or layouts)									
DI	Possibility to input auxiliary signals (digital and analog)									
LVD	Color value distribution along Extreme, ROD, or Bend Line									
BM**	Allows measuring deflection and sway and their side visualizations									
HS**	High-speed recorder functionality									
FLC**	Evaluation of Forming Limit Curves									
3D*	3D DIC Stereoscopic Module									

\* presence depends on selected DIC configuration

\*\*Expansion software module available for DIC systems

## SYSTEM REQUIREMENTS

System requirements	System requirements   Recommended
CPU	Intel/AMD 2GHz 2-core (>3000 points - Average CPU Mark *) Intel/AMD 4GHz >8-core (>4000 points - Single Thread Rating **)
GPU	NVidia/AMD/Intel OpenGL 3.0 1024x768px (>300 points ***) NVidia/AMD/Intel OpenGL 3.0 1920x1200px (>5000 points ****)
Memory	8GB   32GB DDR4
Disk	8GB HDD free   1TB SSD / M.2
Ports	1x USB (HW key), 1x USB3.0 for each camera; (Optional) 1x USB for peripheral data transfer device (Optional) 1x Ethernet Port of MODBUS or TCP/IP communication
Operating System	Windows 11 64-bit ***** or Windows 10 64-bit ***** Windows Server 2019 ***** or Windows Server 2022 *****

\* MID CPU BENCHMARK [www.cpubenchmark.net](http://www.cpubenchmark.net)

\*\* HIGH-END CPU BENCHMARK [www.cpubenchmark.net](http://www.cpubenchmark.net)

\*\*\* MIDLOW GPU BENCHMARK [www.videocardbenchmark.net](http://www.videocardbenchmark.net)

\*\*\*\* HIGH-END GPU BENCHMARK [www.videocardbenchmark.net](http://www.videocardbenchmark.net)

\*\*\*\*\* Latest Release on date of purchase

# FIELD OF VIEWS & WORKING DISTANCE

Bellow charts show the dependency of working distance on the field of view for each X-Sight system with various lens models.

