X·SIGHT

X-SIGHT 4000-3D SERIES
Universal Optical Extensometer

FEATURES
- All-in-one box extensometer
- Ideal for general tensile tests
- 3D capabilities
- Resilient to out-of-plane error

SOFTWARE
- X-Sight Alpha
- Axial software module included
- Additional advanced features

SUPPORTED OPERATING SYSTEMS
- Win 11 64bit / Win 10 64bit
- Win Server 2019 / Win Server 2022

Latest Release on date of purchase

X-SIGHT 4000-3D SERIES VE COMES WITH TWO CAMERAS, TWO LENSES, LIGHT, BUILT-IN USB RELAY, GRID AND CALIBRATION GRID.

OVERVIEW

The X-Sight 4000-3D series is a universal stereoscopic video extensometer (3DVE) equipped with two cameras to capture spatial movements and deformations. The 3D feature makes it resilient to errors caused by out-of-plane movements and increases accuracy. The 3DVE provides multiple values simultaneously, allowing measurement at different positions or with different gauge lengths. It measures strain, total length, delta length, angle, and much more.

MODELS

The 3DVE optical extensometer is produced with two camera resolutions to fit application requirements. The model selection typically depends on the specimen size, behavior, and the accuracy class required by ISO, ASTM, DIN, or other standards. The 3DVE comes in the following models:

X-Sight-4105-3D	X-Sight-4109-3D

MEASURING LENGTH

A lens and working distance selection modify each model's measuring length. In practice, the required accuracy class, which dictates the strain or elongation resolution, determines the maximum measuring length.

Model Designation	Measuring Length at Class 0.5 [mm]	Measuring Length at Class 1 [mm]
XSight-4105-3D	120	220
XSight-4109-3D	220	440

SAMPLING RATE

The camera resolution and 5Gbps data throughput of the USB 3.0 bus determine the default sampling rate.

Model Designation	Sampling Rate at Full View [Hz]	Typical Sampling Rate [Hz]
XSight-4105-3D	75	**175**
XSight-4109-3D	32	**75**

The sampling rate can be increased up to 1kHz by reducing the width of the camera view, which is, in most cases, not necessary.
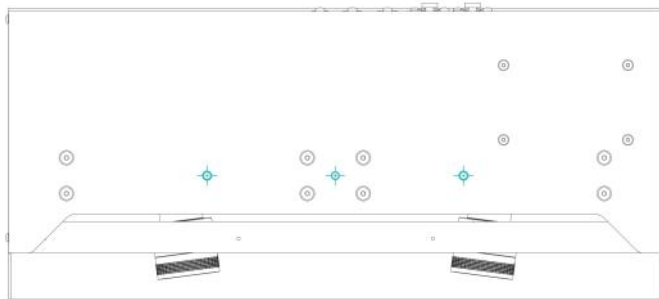
WORKING DISTANCE

As already outlined, the working distance is part of a triangular selection along with measuring length and lens focal length. By selecting two of these values, the third is determined. A typical working distance for the 3DVE extensometer is **300-500 mm**, measured from the front cover edge. This range can be extended on demand.

Be aware that positioning the 3DVE unit at a longer distance reduces the LED light intensity and may eventually increase the shutter time needed to obtain bright images, thereby reducing the sampling rate. Check the Working Distances page of this datasheet to learn more about the distances for each camera/lens combination.

MECHANICAL INTERFACE

The 3DVE unit can be mounted via a **1/4" UNC** threaded hole in the middle of the bottom plate to a tripod head for portable use. However, a common way of mounting the 3DVE to a UTM is using two **M6** screw holes with a **165 mm** vertical span, securing the system in a fixed position.

▲The bottom plate of the 4000-3D series – 1/4" UNC in the middle and M6 screw holes

MECHANICAL DIMENSIONS

The following table includes the mechanical dimensions for each 3DVE unit.

Dimension	Value
Length	424 mm
Width	187 mm
Height	80 mm
Weight	2.6 kg

LIGHT PARAMETERS

3DVE unit is equipped with a L400 Blue LED light.

Parameter	Value
Active Length	400 mm
Wavelength	465 nm
Luminous Flux	330 lumens
Power	16 W

PC CONNECTION

The 3DVE is connected to the PC using two USB 3.0 cables for each camera unit and one USB 2.0 cable for relay operation. The standard cable length is **3m**. All cables can be extended using Active Optical Cables. A USB 3.0 extension card for the PCIe slot supplied by X-Sight is recommended to secure a stable camera connection, as some integrated USB 3.0 ports may lack appropriate bandwidth.

DATA TRANSFER

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**

  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 (requires Device Input software module – DI).

The API communication allows the remote operation of the 3DVE. This feature includes commands like START/STOP, Method Switch, Set Gauge Length, and others. For more info, check out the **Communication Options** document.
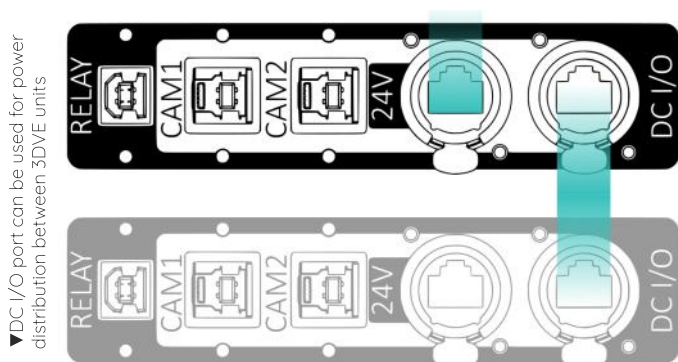
POWER CONNECTION

An Ethernet PoE cable provides power for the 3DVE unit. This cable is connected to a 24V marked RJ45 port on the backside of the 3DVE unit.

An 802.3af Mode B PoE standard is used to power the 3DVE unit.

Pin	Connection
4 & 5	DC+ (24V)
7 & 8	DC- (GND)

When using multiple 3DVE units, the power can be distributed via the DC I/O ports in the following serial manner.

▶ DC I/O port can be used for power distribution between 3DVE units

The DC I/O port can be used as an alternative power **INPUT**. In such a case, the power is distributed directly to the LED light, bypassing the USB relay.

When using the DC I/O port as a power **OUTPUT**, it provides the 24V DC voltage only when the USB relay is switched ON. A typical use of DC output is the powering of an auxiliary light.

POWER CONSUMPTION

Each camera 3DVE unit has the following power consumption.

Dimension	Value
Cameras	6 W
USB relay	1 W
L400 LED Light	16 W
SUM	**23 W**

The cameras and the relay are powered via the USB bus.

OPERATION CONDITIONS

The 3DVE unit is designed for indoor use only. Do not allow the device to get wet.

Item	No. of pieces
Temperature	5–40 °C
Humidity	30–70 %

The 3DVE allows measurement through glass or the use of a mirror. In such cases, these optical elements must be of high optical quality to avoid introducing unwanted disturbances to the measurement. When measuring through glass, a polarization set may be required to reduce or eliminate light reflections. When measuring with a climatic chamber, be aware that vibrations and heat turbulence may introduce a raised noise base to your signal. This equipment is compatible with Class A of CISPR 32. In a residential environment, this equipment may cause radio interference.

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

PACKAGE CONTENTS

The 3DVE unit has two lenses of a specified focal length (upon request), a 400 mm blue LED light, and an internal USB relay. Each system contains one calibration grid of a size adequate for the desired application. 3DVE systems include MONO grids.

Item	No. of pieces
3DVE unit	1
Cable harness	1
Power Supply	1
Calibration Grid	1
Installation USB	1
USB License Key	1

FIELDS OF VIEWS & WORKING DISTANCES

The following tables show the relationship between the camera resolution, lens focal length, and working distance of individual X-Sight 4000-3D systems.

X-Sight-4105-3D						
ISO 9513 class	Field of View [mm]		Working Distance [mm]			
			Lens Focal Length [mm]			
	Height	Width	12	16	25	35
0.5	110	92	NA	190	300	440
1	220	184	290	380	620	NA

X-Sight-4109-3D						
ISO 9513 class	Field of View [mm]		Working Distance [mm]			
			Lens Focal Length [mm]			
	Height	Width	12	16	25	35
0.5	220	116	165	230	380	558
1	440	232	360	485	775	NA

ALPHA DIC SOFTWARE

The X-Sight 4000-3D series optical extensometer runs on the X-Sight Alpha software, delivering high-quality measurement results while providing a straightforward user experience.
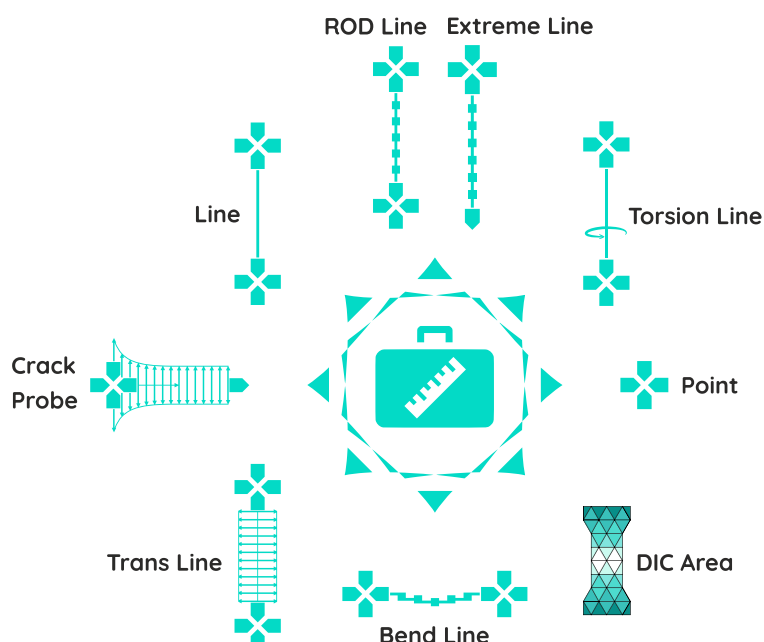
MODULARITY AND PROBES

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

The 3DVE typically includes an AXIAL software module plus a 3D module for line-based probes. The measurements with the 3DVE are primarily performed in real-time using line-based measuring probes with online data transfer to the testing machine.

However, to get the most out of an optical strain measuring device, there is an option to add a post-processing feature. In post-processing, the number of line-based probes can be multiplied or switched to an area strain or displacement mapping function.

LICENSING

The X-Sight optical extensometers have a perpetual X-Sight Alpha software license bonded to a HW USB dongle. This allows the user to install the software on unlimited computers and use it only on the one where the license key is plugged in. This method of licensing makes it easy to switch the computer in case of a PC breakdown.

ROD Line   Extreme Line

Line

Torsion Line

Crack Probe

Point

Trans Line

DIC Area

Bend Line

Software Module	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								

* Expansion software module requires the presence of AX.

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	4GB	16GB DDR4
Disk	8GB HDD free	1TB SSD / M.2
Ports	1xUSB (HW key), 1xUSB3.0 for each ONE device + 1xUSB2.0 (relay) (Optional) 1xUSB for peripheral data transfer device (Optional) 1xEthernet 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
** HIGH-END CPU BENCHMARK www.cpubenchmark.net
*** MIDLOW GPU BENCHMARK www.videocardbenchmark.net

**** HIGH-END GPU BENCHMARK www.videocardbenchmark.net
***** Latest Release on date of purchase