X-SIGHT 4106 (ASTM)

ASTM-focused Optical Extensometer

FEATURES

- All-in-one box extensometer
- Ideal for general tensile tests
- For up to 20” (520 mm) measuring length
- Stackable for joined fields of view

SOFTWARE

- X-Sight Alpha DIC®
- 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 4106 (ASTM) OE comes with a camera, lens, light, and calibration grid.

UNIVERSAL OPTICAL EXTENSOMETER – BUILT FOR LARGER SPECIMENS

OVERVIEW

The X-Sight 4106 is a versatile optical extensometer (OE) designed for tensile testing across a broad spectrum of engineering materials.

X-Sight 4106 provides a larger illuminated area than X-Sight 2106. This makes it a better choice for longer or high-elongating specimens.

It accurately measures strain, total length, delta length, angle, and much more.

MODELS

The X-Sight 4106 is available in both single and multiple-camera configurations. The model designation follows this format:

X-Sight-4x06

where the position **x** typically takes the value **1**, **2**, or **3**, indicating the number of OE units included in the system setup.

MEASURING LENGTH

The maximum length of the system's field of view on which the device fulfills the resolution requirements is given by the **ASTM E83** standard.

Adding an extra OE unit almost doubles the Measuring Length, leaving just a small portion of the image for overlap.

Model Designation	Max Measuring Length for Class B-1 [in] Gauge Length 0.5"	Max Measuring Length for Class B-1 [in] Gauge Length 1"
X-Sight-4106	12	18
X-Sight-4206	N/A	35.5
X-Sight-4306	N/A	53

Be aware that OE unit is 16.7" long, so fields of view shorter than this value cannot be joined due to mechanical interference.

SAMPLING RATE

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

Sampling Rate at Full View [Hz]	Typical Sampling Rate [Hz]
60	200

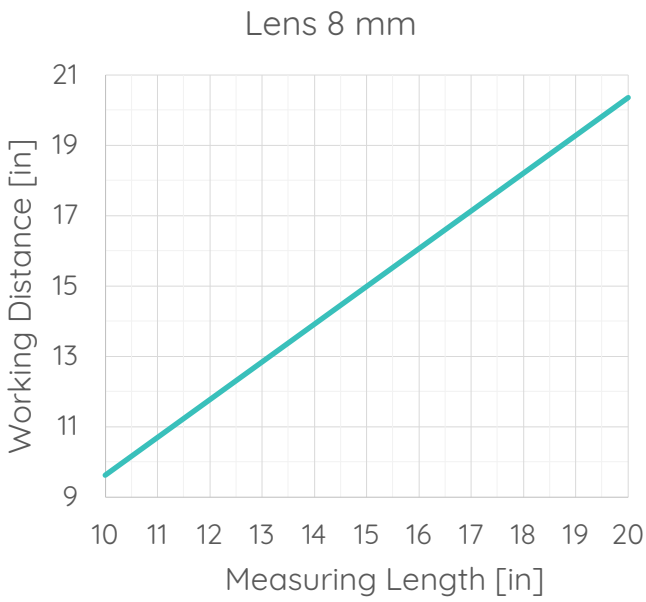
The sampling rate can be raised up to 500 Hz by reducing the width of the camera view, which is, in most cases, not used.

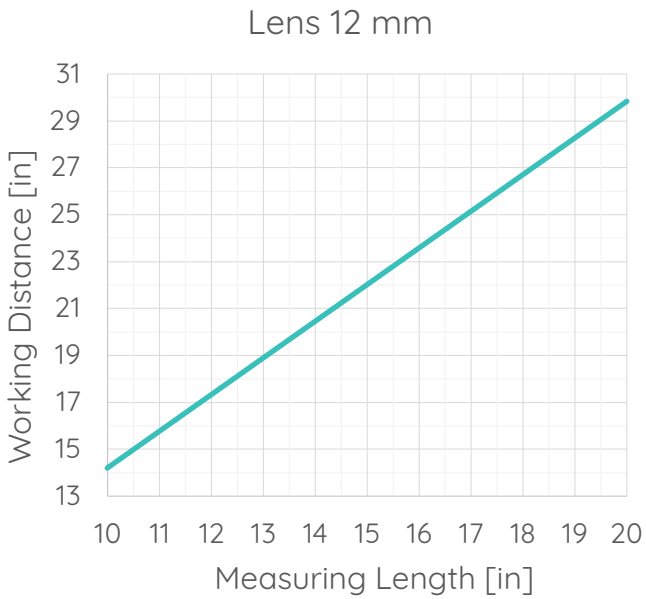
WORKING DISTANCE

The device comes equipped with a low-distortion 8 mm lens. The chart below shows the dependency of Working Distance on the desired Measuring Length.

A 12 mm lens can be used instead if a shorter Measuring Length is required. This increases the Working Distance while reducing the Measuring Length.

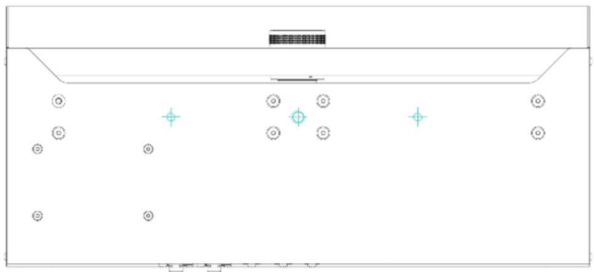
The request for a 12 mm lens must be specified when ordering the system; otherwise, the standard 8 mm lens will be used.





MECHANICAL INTERFACE

The OE 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 OE 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 X-Sight-4106 – 1/4" UNC in the middle and M6 screw holes

MECHANICAL DIMENSIONS

The following table includes the mechanical dimensions for each OE unit.

Dimension	Value
Length	424 mm; 16.7”
Width	187 mm; 7.36”
Height	80 mm; 3.15”
Weight	5.5 lbs. (per OE unit)

LIGHT PARAMETERS

Each OE 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

LIGHT CONTROL

The X-Sight-4106 does not include a USB relay by default but can be equipped with one.

The request for a USB relay must be stated in the order.

PC CONNECTION

The OE is connected to the PC using one USB 3.0 cable for each camera unit and one USB 2.0 cable for relay operation (if present). **The standard cable length is 9.85 ft** (3m). All cables can be extended using Active Optical Cables.

A USB 3.0 extension card to 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 DIC software (force, temperature, pressure) is also possible (requires Device Input software module – DI).

The API communication allows the OE to be remotely operated. This feature includes commands like START/STOP, Method Switch, Set Gauge Length, and others. For more info, check out the **Communication Options** document.

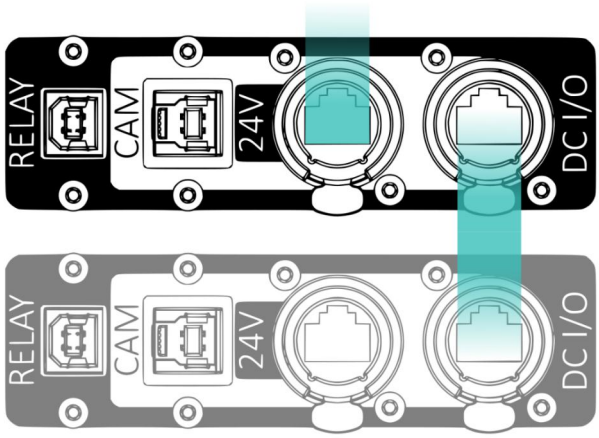
POWER CONNECTION

An ethernet PoE cable provides power for OE unit. This cable is connected to a 24 V marked RJ45 port on the back side of OE unit.

An 802.3.af Mode B PoE standard is used to power the X-Sight-4106 unit.

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

When using multiple cameras, 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 OE 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 (if present).

The DC I/O port as a power **OUTPUT** provides the 24 V DC voltage only when the USB relay is switched ON (if present). A typical use of DC output is the powering of an auxiliary light.

POWER CONSUMPTION

Each OE unit has the following power consumption.

Dimension	Value
Camera	3 W
USB relay (if present)	1 W
L400 LED Light	16 W
SUM (incl. relay)	**20 W**

The camera and the relay (if present) are powered via the USB bus.

OPERATION CONDITIONS

The X-Sight 4106 unit is designed for indoor use only. Do not allow the OE unit to get wet.

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

X-Sight 4106 allows measurement through the glass or the use of a mirror. In such cases, these optical elements must be highly optical 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 CISPR 32. In a residential environment, this equipment may cause radio interference.
This product complies with EU Directive 2002/96/EC and FCC regulations.

PACKAGE CONTENTS

Each OE unit has an 8 mm lens (unless changed upon request) and 400 mm LED light.
Each system contains one calibration grid of size adequate to a desired application. Single camera systems include MONO grids, and multiple camera systems include JOINED grids to allow stitching of the camera views.

Item	No. of pieces
OE unit*	Typically, 1
Cable Harness	1
Power Supply	1
Calibration Grid	1
Installation USB	1
USB License Key	1

*Depends on the X-Sight 4x06

ALPHA DIC SOFTWARE

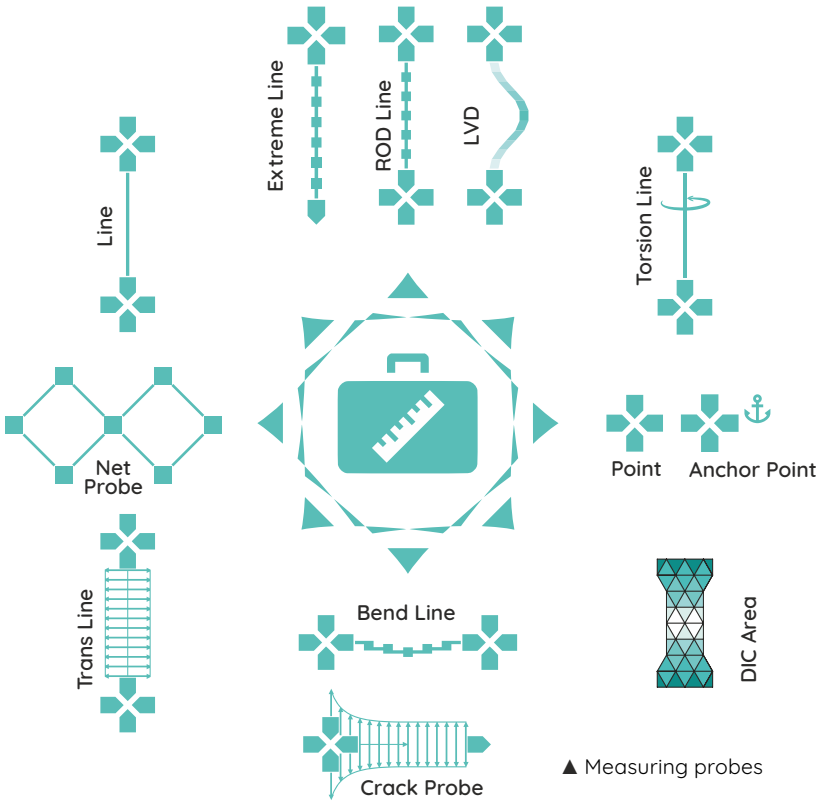
X-Sight 4106 OE runs on the X-Sight Alpha DIC software to deliver high-quality measurement results while providing a straightforward user experience.

MODULARITY AND PROBES

The X-Sight Alpha DIC software is split into several modules. Modules group different measuring probes or advanced features.
The OE typically includes an **AXIAL software module** (AX).
The measurements with OE 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

X-Sight 4106 has a perpetual X-Sight Alpha DIC software license bonded to an 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.



▲ Measuring probes

SW Module	Point	Anchor	Line	Extreme Line	Trans Line	Bend Line	Torsion Line	Crack Probe	ROD Line	Net Probe	DIC Area
AX	•	•	•	•							
TR*					•	•					
TO*							•				
CR*								•			
ITT*									•		
NP*										•	
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										
FLC**	Evaluation of Forming Limit Curves										
3D	3D DIC Stereoscopic Module										

* Expansion software module requires the presence of AX
**Available only for 3D setups

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 1024×768px (>300 points ***) | NVidia/AMD/Intel OpenGL 3.0 1920×1200px (>5000 points ****)
Memory	4GB | 16GB DDR4
Disk	8GB HDD free | 1TB SSD / M.2
Ports	1× USB (HW key), 1×USB 3.0 for each 4106 device (If the relay is present) + 1× USB 2.0; (Optional) 1× USB for peripheral data transfer device (Optional) 1× 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
** 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