X-SIGHT 4000 SERIES

Universal Video Extensometer

FEATURES

- All-in-one box extensometer
- Ideal for general tensile tests
- For up to 500 mm measuring area
- Stackable for joined fields of view

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 SERIES VE COMES WITH A CAMERA, LENS, LIGHT, BUILT-IN USB RELAY, GRID, AND CALIBRATION GRID

OVERVIEW

The 4000 series is a universal video extensometer (VE) suitable for a wide range of material and component testing like tensile, compression, flexural, shear, and torsional tests.

The 4000 VE provides a larger illuminated area than 2000 series. This makes it a better choice for longer or high-elongating specimens.

Measures strain, total length, delta length angle, and much more.

MODELS

The 4000 series optical extensometer is produced in different camera resolutions to fit the application requirements. The model selection typically rises from the specimen size behavior and accuracy class required by the ISO, ASTM, DIN, or other standards.

The VE comes in the following models, where the position **xx** refers to the camera's resolution.

XSight-41xx				
01	02	05	09	16

The number **1** in the model designation represents the total number of VE units. Typically, only one unit is used. More 4000 series units are set up upon request.

MEASURING LENGTH

A lens and a working distance selection modify each model's measuring length. In practice, the required accuracy class that dictates the strain or elongation resolution gives the maximal measuring length.

Adding an extra VE unit will almost double the measuring length, leaving just a small portion of the image for an overlap.

Model Designation	Measuring Length at Class 0.5 [mm]	Measuring Length at Class 1 [mm]
XSight-4101	80	160
XSight-4102	110	220
XSight-4105	130	260
XSight-4109	220	440
XSight-4116	330	660

SAMPLING RATE

The camera resolution and 5Gbps data throughput of the UBS3.0 bus give the default sampling rate.

Model Designation	Sampling Rate at Full View [Hz]	Typical Sampling Rate [Hz]
XSight-4101	170	200
XSight-4102	42	90
XSight-4105	75	175
XSight-4109	32	75
XSight-4116	23	70

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

WORKING DISTANCE

As already outlined, the working distance is in a triangle selection together with a measuring length and lens focal length. By selecting two of these values, the third becomes driven. A typical working distance for the X-Sight 4000 series extensometer is **300-500 mm**, measured from the front cover edge. This range can be extended on demand.

Be aware that positioning the VE unit at a longer distance reduces the LED light intensity and may eventually increase the shutter time needed to obtain bright images and reduce 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 VE 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 VE 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 series – 1/4" UNC in the middle and M6 screw holes

MECHANICAL DIMENSIONS

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

Dimension	Value
Length	424 mm
Width	187 mm
Height	80 mm
Weight	2.5 kg (per VE unit)

LIGHT PARAMETERS

Each VE 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 4000 series is connected to the PC using one USB 3.0 cable for each VE 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 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

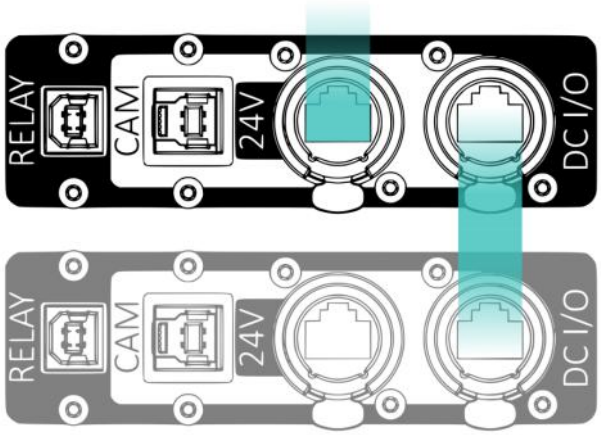
INPUT of external data to X-Sight Alpha software (force, temperature, pressure) is also possible (requires Device Input software module – DI).
The API communication allows the VE to be remotely operated. This feature includes commands like START/STOP, Method Switch, Set Gauge Length, and others. For more info, check out the **Communication Options** document.

POWER CONNECTION

An ethernet PoE cable provides power for the VE unit. This cable is connected to a 24 V marked RJ45 port on the back side of VE unit.
An 802.3.af Mode B PoE standard is used to power the VE 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 VE 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 VE unit has the following power consumption.

Dimension	Value
Camera	3 W
USB relay	1 W
L400 LED Light	16 W
SUM	**20 W**

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

OPERATION CONDITIONS

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

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

The VE allows measurement through the glass or the use of a mirror. In such cases, these optical elements must be of 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 VE unit has one lens of a specified focal length (upon request), 400 mm blue LED light, and an internal USB relay.
Each system contains one calibration grid of size adequate to a desired application. Single camera unit system set-ups include MONO grids, and multiple camera system set-ups include MONO grids to allow stitching of the camera views.

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

▲*Depends on the X-Sight 4000 series model

FIELDS OF VIEWS & WORKING DISTANCES

The following tables show the relationship between individual 4000 series systems' camera resolution, lens focal length, and working distance.

XSight-4x01									
ISO 9513 class	Field of View [mm]				Working Distance [mm]				
	XSight-4101		XSight-4201		Lens Focal Length [mm]				
	Height	Width	Height	Width	12	16	25	35	50
0.5	80	64	2x80	64	127	169	297	455	685
1	160	128	2x160	128	285	380	621	909	1338
2	320	256	2x320	56	600	803	1269	1818	2643

XSight-4x02									
ISO 9513 class	Field of View [mm]				Working Distance [mm]				
	XSight-4102		XSight-4202		Lens Focal Length [mm]				
	Height	Width	Height	Width	12	16	25	35	50
0.5	110	70	2x110	70	-	134	237	322	430
1	220	120	2x220	120	176	253	416	571	785
2	440	238	720	238	379	523	841	1155	1630

XSight-4x05									
ISO 9513 class	Field of View [mm]				Working Distance [mm]				
	XSight-4105		XSight-4205		Lens Focal Length [mm]				
	Height	Width	Height	Width	12	16	25	35	50
0.5	130	109	2x130	109	156	213	357	520	710
1	260	218	2x260	218	335	459	737	1054	1480
2	520	435	1040	435	639	950	1498	2123	3020

XSight-4x09									
ISO 9513 class	Field of View [mm]				Working Distance [mm]				
	XSight-4109		XSight-4209		Lens Focal Length [mm]				
	Height	Width	Height	Width	12	16	25	35	50
0.5	220	116	2x220	116	169	233	378	519	720
1	440	232	820	232	364	494	758	1063	1485
2	880	464	1680	464	748	1017	1519	2152	3055

XSight-4x16									
ISO 9513 class	Field of View [mm]				Working Distance [mm]				
	XSight-4116		XSight-4216		Lens Focal Length [mm]				
	Height	Width	Height	Width	12	16	25	35	50
0.5	330	188	2x330	188	262	352	556	782	1122
1	660	376	1280	376	533	714	1122	1575	2254
2	1320	752	2600	752	1077	1439	2254	3159	4518

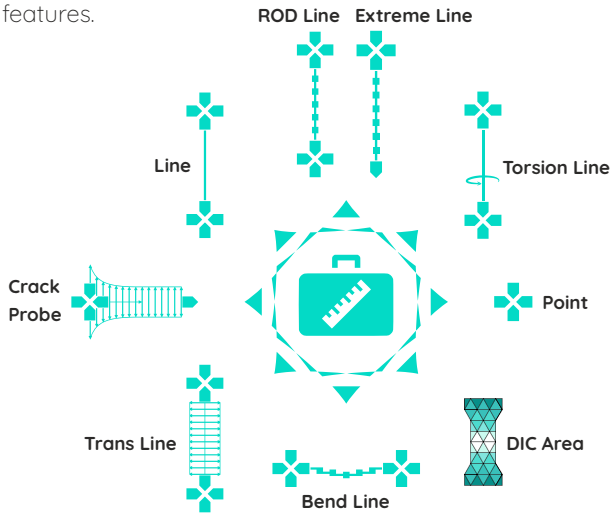
VALUE – due to a large field of view, the built-in LED light might not be able to illuminate the whole length of the specimen. Consider the use of an additional light.

VALUE – consider the X-Sight 2000 series model, as the field of view is smaller than the LED length.

The 4000 series optical extensometer runs on the X-Sight Alpha software to deliver high-quality measurement results while providing a straightforward user experience.

MODULARITY AND PROBES

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



The VE typically includes an AXIAL software module.
The measurements with VE 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 for an area strain or displacement mapping function.

LICENSING

The 4000 series has 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 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.

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