



X-SIGHT HITEX

Optical Extensometer for TMF Testing

FEATURES

- Designed for Thermo-mechanical Fatigue (TMF) experiments under extreme thermal loading conditions
- Supports Low Cycle Fatigue (LCF) with high strain amplitudes
- Possibility of strain-controlled tests
- High resolution telecentric lens

SOFTWARE

- X-Sight Alpha DIC®
- Tensile (axial), compression, shear, bending and torsional tests
- Recording and post-process option
- 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 HITEX OE comes with an industrial camera, telecentric lens with a band-pass filter, thermal camera, line laser, built-in USB relay, installation medium, USB license key and calibration grid.

T A
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www.tacr.cz/en

THE HITEX IS A PROFESSIONAL OPTICAL EXTENSOMETER OPTIMIZED FOR PRECISE STRAIN MEASUREMENT DURING HIGH-TEMPERATURE FATIGUE TESTING.

OVERVIEW

The HITEX (an abbreviation from **H**igh **T**emperature **E**xtensometer) is a professional non-contact optical extensometer optimized for cyclical thermal loading where precise strain measurement during rapid heating and cooling cycles is required.

The system features a high-resolution, low distortion telecentric lens, ensuring precise and consistent measurements. The telecentric design minimizes out-of-plane movement and maintains uniform magnification across the field of view. This lens is paired with an industrial-grade digital camera, capable of capturing detailed images with exceptional clarity.

Equipped with UV and IR band-pass filters, the lens effectively suppresses unwanted parts of the light spectrum, enhancing measurement reliability. Depending on the application and testing conditions, the system can be equipped with either a green line laser or a white LED spotlight to provide suitable illumination of the specimen surface. For advanced applications, the system offers the option of external camera triggering, allowing synchronization with other devices and systems.

Furthermore, the system integrates an infrared thermal imaging camera for contactless monitoring of the sample surface temperature during testing.

To maintain performance in high-temperature environments, the system incorporates an active cooling mechanism. This ensures stable operation and protects sensitive components from heat damage. The system is designed to meet the rigorous demands of various high-temperature testing environments up to 1800 °C, including material fatigue testing and low-frequency cycling tests.

MEASURING LENGTH

Unlike classic endocentric lenses, where the field of view can be adjusted by choosing the focal length, the field of view of a telecentric lens depends on the configuration and magnification of its optical elements. This unique characteristic ensures that the size of images produced by a telecentric lens remain consistent regardless of the distance between the image plane and the lens, making them ideal for precision optical measurements.

The maximum length of measurement for this system is 36 mm. From these parameters, the resolution can then be determined, which corresponds to ISO 9513 Class 0.5.

Model Designation	Measuring Length [mm]	Resolution [µm]*
X-Sight-Hitex	36	<0,5

▲ *At room temperature. Resolution at elevated temperature is highly affected by boundary conditions (vibrations, air turbulence).

SAMPLING RATE

The camera resolution and 5 Gbps data throughput of the USB 3.0 bus give the default sampling rate, which can be further increased by cropping the sensor readout area.

Model Designation	Sampling Rate at Full View [Hz]	Typical Sampling Rate [Hz]
X-Sight-Hitex	170	245

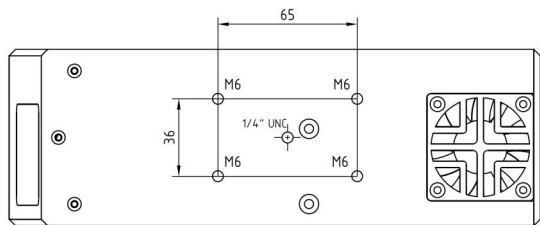
WORKING DISTANCE

As already outlined, the images produced by a telecentric lens are insensitive to the distance between the image plane and the lens. The lens itself has a predefined working distance which maintains its ideal telecentric properties with a tolerance of a few % of the nominal value.

Model Designation	Working Distance [mm]	Tolerance Deviation [%]
X-Sight-Hitex	125	± 1

MECHANICAL INTERFACE

The HITEX 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. Nonetheless, a common way of mounting the HITEX to a UTM is using four **M6** screw holes and a proprietary profile adapter (sold separately).



▲ The bottom plate of the X-Sight Hitex -1/4" UNC in the middle and four M6 screw holes.

MECHANICAL DIMENSIONS

The following table includes the mechanical dimensions of a Hitex unit.

Dimension	Value
Length	253 mm
Width	71 mm
Height	136 mm
Weight	2.5 kg

LIGHT PARAMETERS

The HITEX unit can be equipped with either a white LED spotlight or a monochromatic green line laser.

Parameter	LED Spotlight	Line Laser
Light color	white	green
Power	2 W	1 W
Color temperature	6020 K	-
Wavelength	-	515 nm

PC CONNECTION

The HITEX is connected to the PC using one USB 3.0 cable for the camera and one USB 2.0 cable for the thermal camera and relay operation. The standard cable length is **3 m**. 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 the HITEX unit. This cable is connected to a 24 V marked RJ45 port on the back side of the HITEX unit.

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

Power supply is not part of the system.

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

POWER CONSUMPTION

The power consumption of each component of the HITEX unit goes as follows:

Dimension	Value
Camera	3 W
USB relay	1 W
Thermal camera	2.5 W
LED Spotlight Laser	2 W 1 W
SUM	8.5 W 7.5 W

Cameras and the relay are powered via the USB bus.

MEASUREMENT CONDITIONS

To achieve the best measurement results, we recommend following our guidelines for optimal measurement conditions. Hot air turbulence in front of the furnace can significantly impact on the overall image quality and should be avoided. This can be mitigated by using a tunnel between the lens and the furnace or by employing a fan to redirect the airflow.

Another potential source of disturbance is the tilt of the furnace window, which may cause reflections captured by the camera, thereby affecting the measurement accuracy. It is advisable to consider this factor and position the system accordingly.

OPERATION CONDITIONS

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

Conditions	Permissible value
Temperature	10–30 °C
Humidity	30–70 %

The HITEX allows measurement through the glass or with 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 with a climatic chamber, the vibrations and heat turbulence may introduce a raised noise base to your signal. For this purpose, the HITEX unit uses a UV and IR filter to minimize the influence of these disturbances on the measurement.

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

The HITEX unit has one industrial camera, telecentric lens with a band-pass filter, thermal camera, line laser, and internal USB relay.

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

Each system contains one calibration grid of size adequate to a desired application.

ALPHA DIC SOFTWARE

The X-Sight HITEX optical extensometer runs on the X-Sight **Alpha DIC** software, delivering high-quality measurement results while providing 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 measurements with HITEX are primarily performed in real-time using line-based measuring probes with online data transfer to the testing machine.

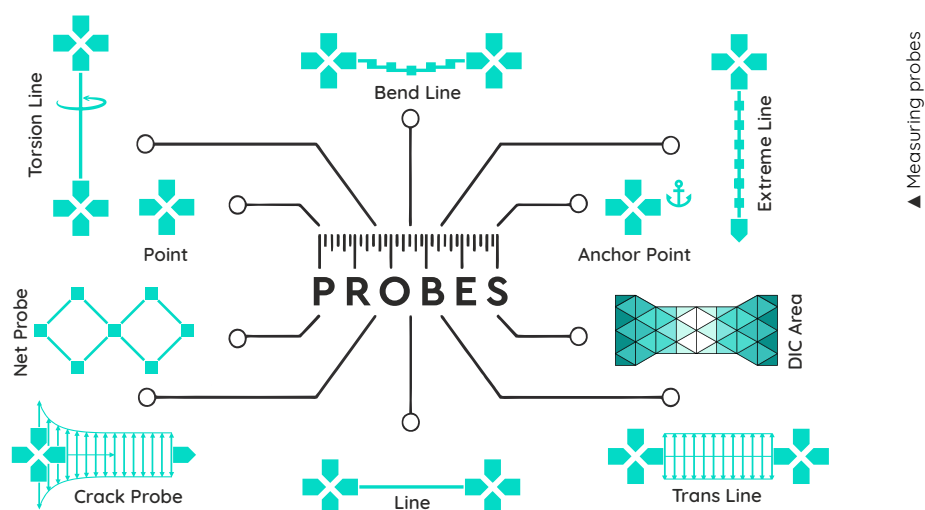
However, to get the most out of an optical strain measuring device, there is an option to add a post-processing feature.

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 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.



SW Module	Point	Anchor	Line	Extreme Line	Trans Line	Bend Line	Torsion Line	Crack Probe	Net Probe	DIC Area
AX	•	•	•	•						
TR*					•	•				
TO*							•			
CR*								•		
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, or Bend Line									

* Expansion software module requires the presence of AX.

SYSTEM REQUIREMENTS

Parameter	Value - Minimum Recommended
CPU	Intel/AMD 2GHz 2-core (>4000-3D 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	1x USB (HW key), 1x USB 3.0 for each OE device + 1x USB 2.0 (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

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