heliotis
advancing 3D metrology

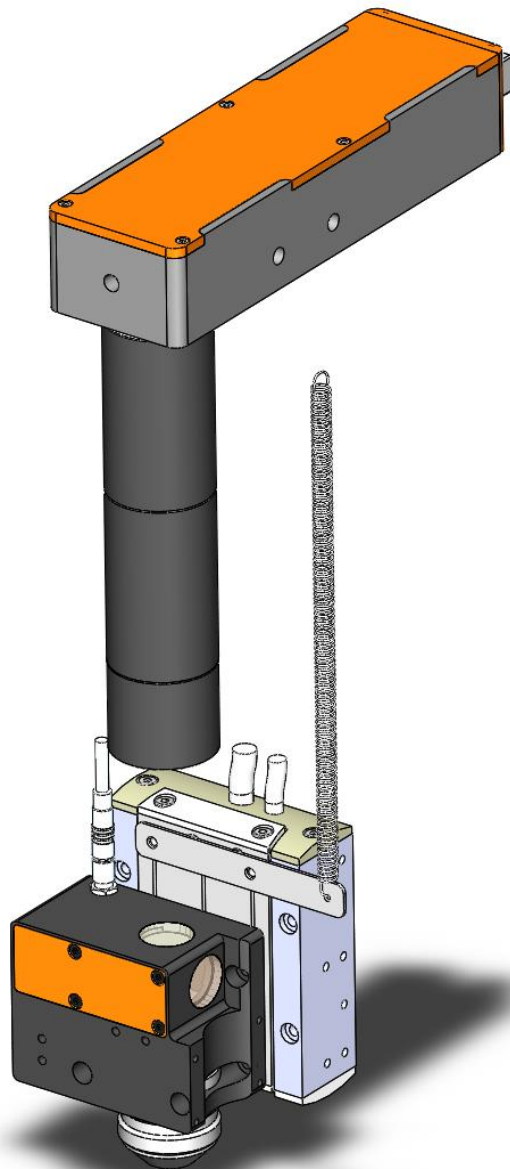# heliOptics™/heliCam™
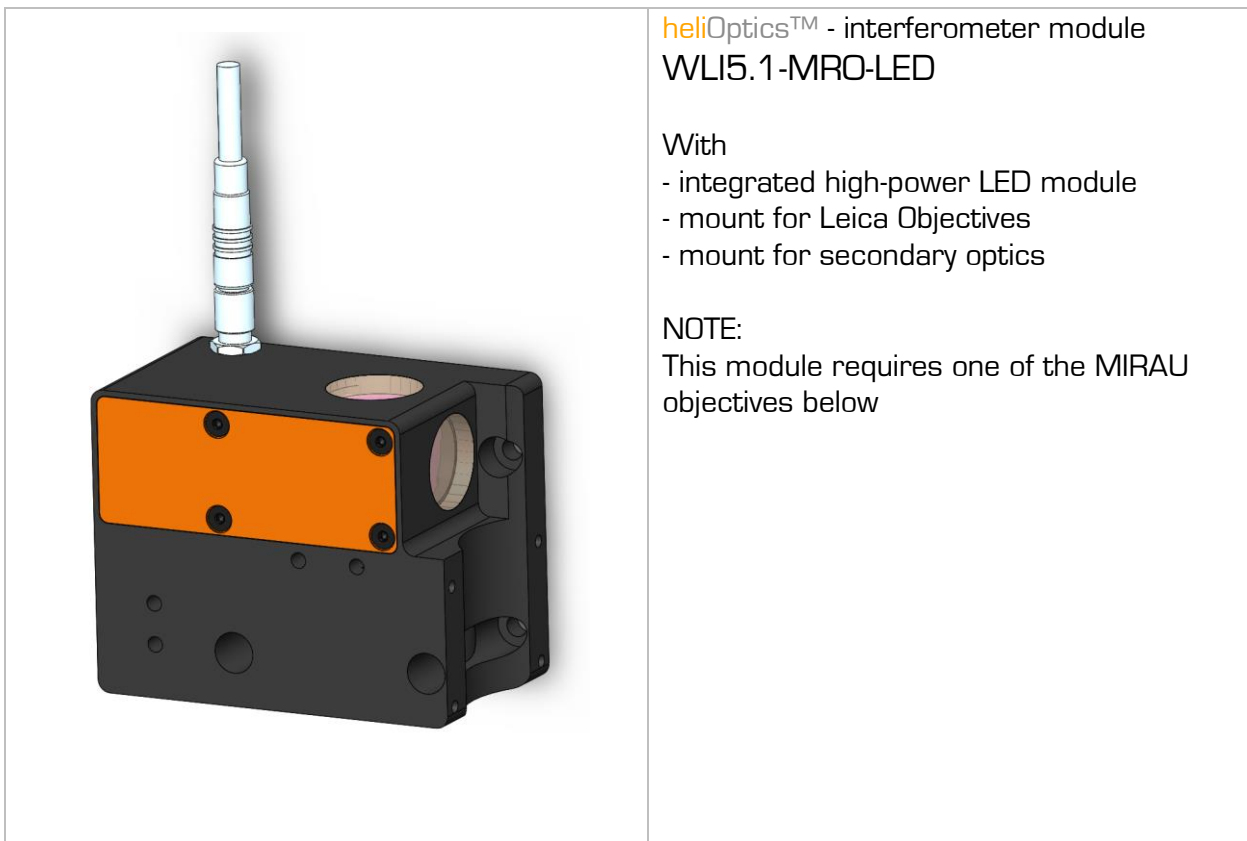# WLI5/C3

SYSTEMS GUIDE

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(A) Configuration Options

1) heliOptics™ WLI5 – interferometer module

In concert with the high-speed camera C3, the interferometer module WLI5 allows for building custom white light interferometers. This modular kit is especially suited for integration into inspection machines with requiring high resolution.

heliOptics™ - interferometer module
WLI5.1-MRO-LED

With
- integrated high-power LED module
- mount for Leica Objectives
- mount for secondary optics

NOTE:
This module requires one of the MIRAU objectives below

2) MIRAU objectives

10X 20x 50x	Leica Microsystems LM-MIRAU-X10 Leica Microsystems LM-MIRAU-X20 Leica Microsystems LM-MIRAU-X50
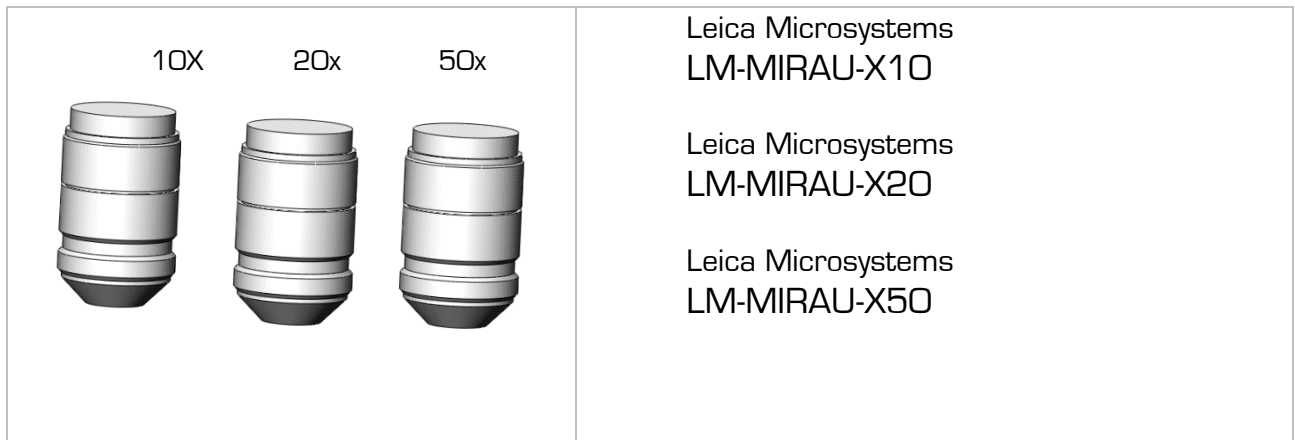
Performance

WLI interferometer	Mirau configuration, exchangeable objectives (10x, 20x, 50x)		
light source	high power LED		
field of view [*]	232x222 µm	580x556 µm	1160x1112 µm
numerical aperture	0.5	0.4	0.3
working distance	2.52 mm	3.57 mm	3.57 mm
vertical resolution [*] (single meas., RMS)	50 nm 1 nm in phase mode	70 nm 1 nm in phase mode	100 nm 1nm in phase mode
vertical scan speed [*]	up to 50 mm per second		
lateral resolution [*]	0.8 µm	2 µm	4 µm
reflectivity of sample [*]	< 0.1% to 100%		

[*] with companion components heliCam™ C3 and high-precision scanner

WLI5C3SG006

3) WLI5 cover

	heliOptics™ - WLI5 cover **WLI5.1-COVER** Optional cover to protect the gap between WLI5 module and imaging tube.

4) heliOptics™ – lens tube

	heliOptics™ - lens tube **WTB2.0-VS** imaging optics with - f = 200 mm - optimized for visible spectrum - C-mount

5) heliCam™ - high speed lock-in camera

heliCam™ - high-speed
lock-in camera
C3.1.1-CP-MLO-X1

- heliSens 3.1 (300x300)
- onChip lock-in detection
- onCamera topology
extraction
- Stratix III FPGA
- 4Gbit RAM
- USB 2.0
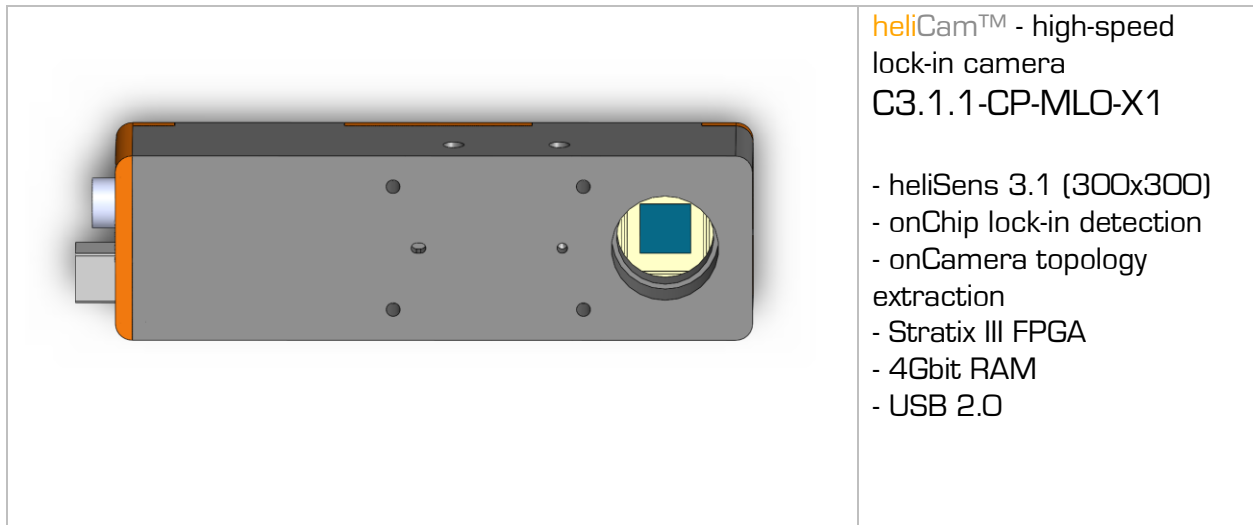
6) Driver Electronics heliDriver™ D1

The heliDriver™ supplies the C3 high-speed camera with power and serves to condition
signals for trigger and position encoders. It can be configured to adapt to various input
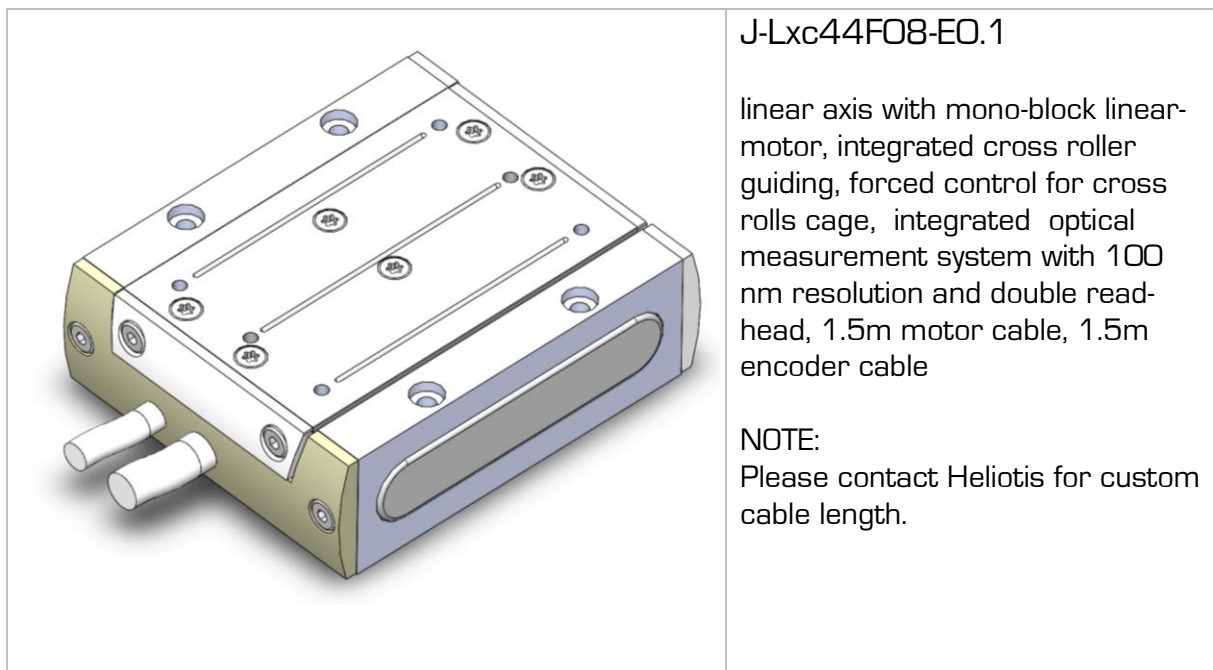voltages and signal levels.

heliDriver™ - driver for WLI5.1
D1.2.2

features
- voltage controlled power supply for
  the C3
- current controlled power supply for
  H4 power LED / SLD
- signal conditioning of trigger and AB
  encoder inputs

Note:
Please contact Heliotis in case of
integration with 3rd scanners or motor
controllers.
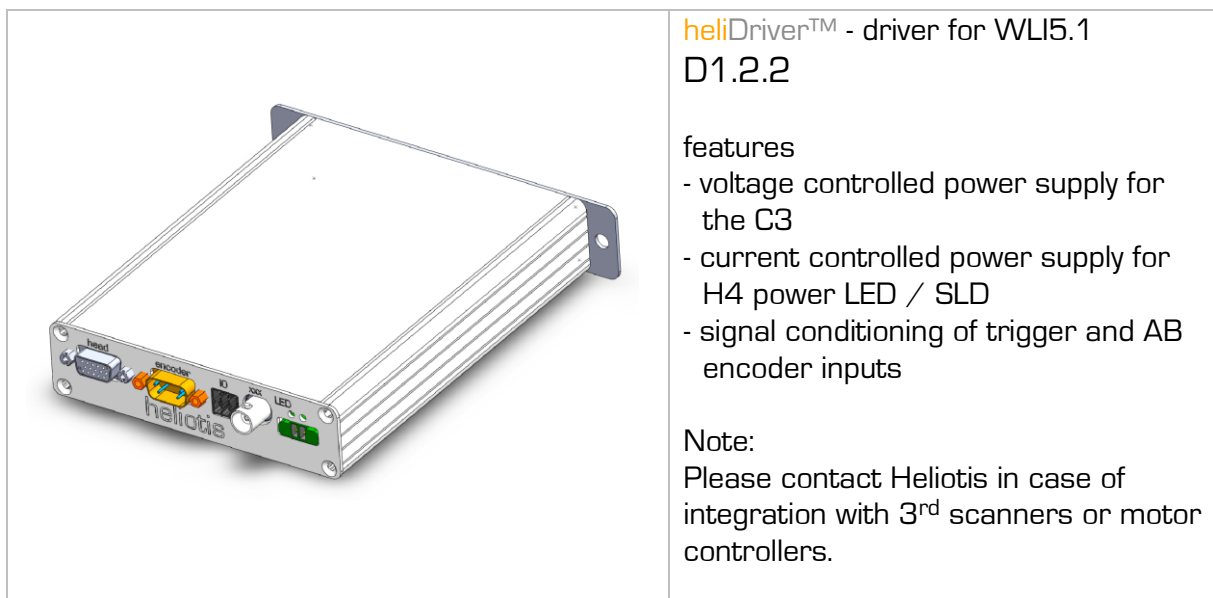
7) Scanner

The measurement principle (i.e. scanning white light interferometry) requires a precise axial movement. Heliotis recommends the following precision linear motor with integrated optical encoders. Its long and precise stroke accomplishes positioning and scanning operations in a single unit.

Note that the system performance may be optimized by selecting alternative scanners for a given application. Examples:
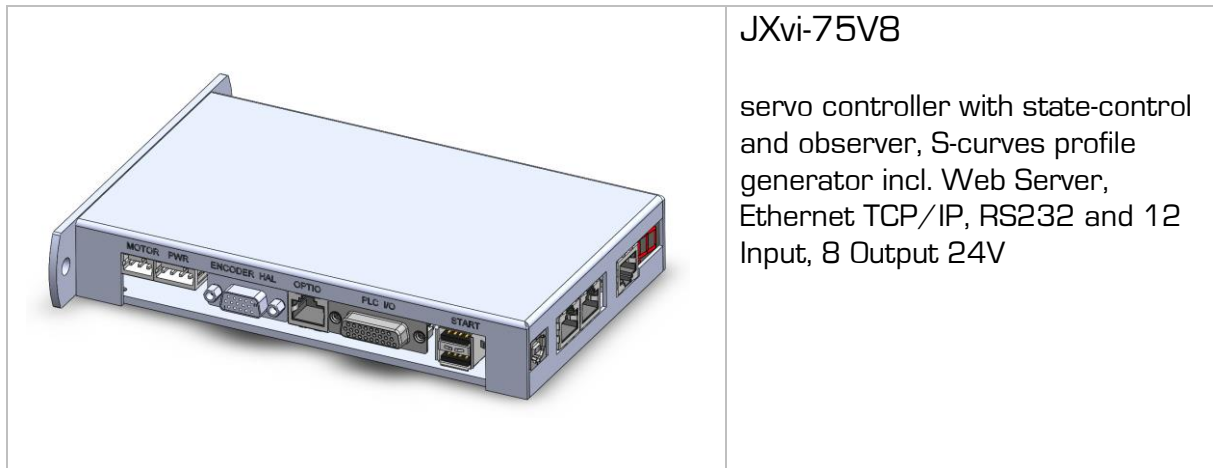
- For small height ranges (<500 micrometers) piezo based scanners may result in higher accuracy and shorter measurement times.
- For high accuracy applications scanners with higher resolution and tighter tolerances should be considered.
- Spindle motors with a high resolution measurement system may reduce system cost and complexity.

Please contact Heliotis in case alternative scanner stages should be used. Our engineers can recommend scanners and settings.

J-Lxc44F08-E0.1

linear axis with mono-block linear-motor, integrated cross roller guiding, forced control for cross rolls cage, integrated optical measurement system with 100 nm resolution and double read-head, 1.5m motor cable, 1.5m encoder cable

NOTE:
Please contact Heliotis for custom cable length.

8) Axis Controller

To control the linear motors of the previous section, we recommend the servo controller below. This model is fully supported by the Heliotis' software development kit and software applications.
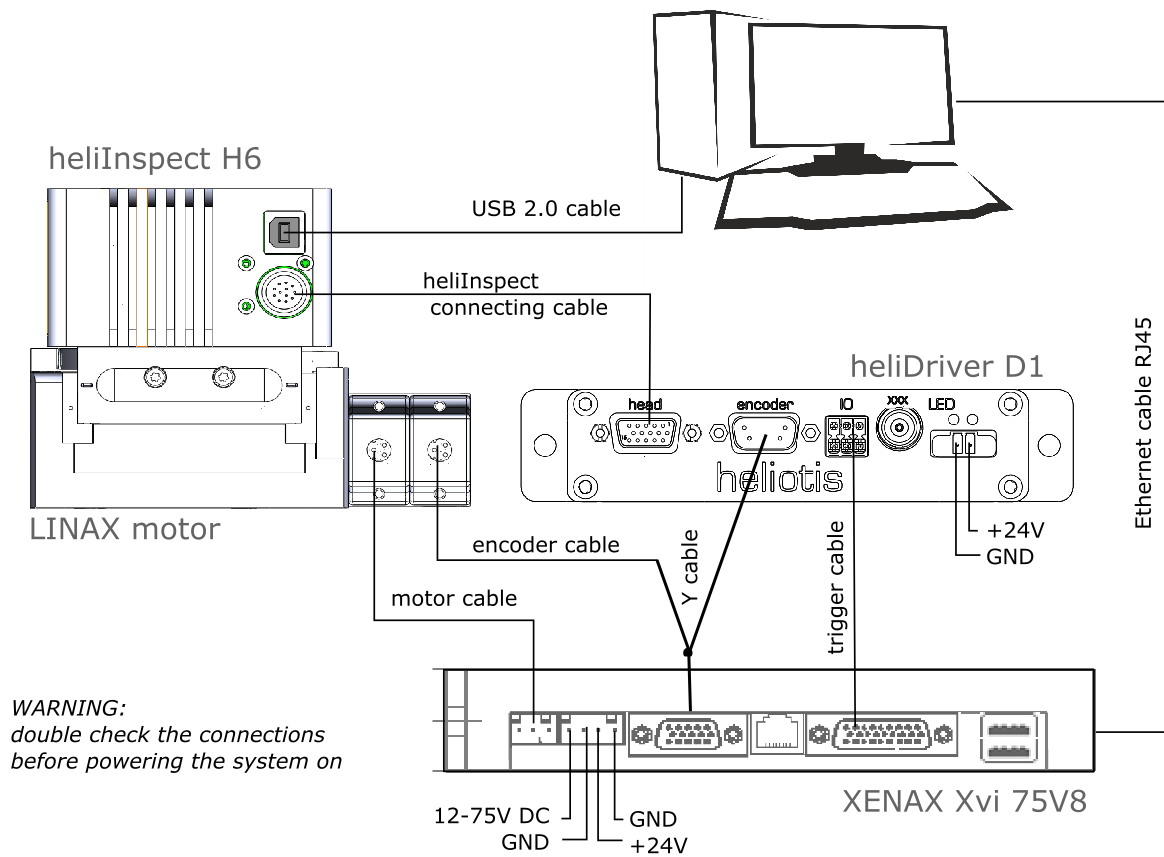
	JXvi-75V8
	servo controller with state-control and observer, S-curves profile generator incl. Web Server, Ethernet TCP/IP, RS232 and 12 Input, 8 Output 24V

9) Cabling

The modular interferometer system should be wired as shown below. Cables come in standard length of 1.5 m, 3 m and 5 m. Please contact Heliotis in case of different length requirements.

For compatibility with drag chains the 'high-flex' cables should be chosen.
Note that the 'trigger cable' comes with the heliDriver™ D1 by default.

heliInspect H6

USB 2.0 cable

heliInspect
connecting cable

heliDriver D1

Ethernet cable RJ45

LINAX motor

encoder cable

motor cable

Y cable

trigger cable

+24V
GND

WARNING:
double check the connections
before powering the system on

12-75V DC
GND

GND
+24V

XENAX Xvi 75V8

connecting cable heliInspect™ HD D-Sub 15P Male --12x0.14mm2— Hirose HR10-10P-12PA	standard cable HI-CC-L1.5-ST (length 1.5m) HI-CC-L3.0-ST (length 3.0m) HI-CC-L5.0-ST (length 5.0m) chain-flex cable HI-CC-L1.5-CF (length 1.5m) HI-CC-L3.0-CF (length 3.0m) HI-CC-L5.0-CF (length 5.0m)
motor cable motor pigtail - Wago 3.5mm	- comes with Lxc motor (pigtail) - standard length is 1.5m Please contact Heliotis for custom length.

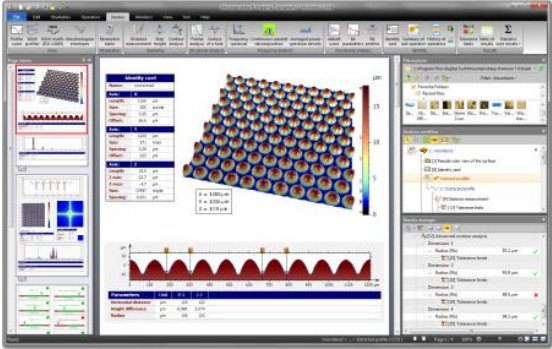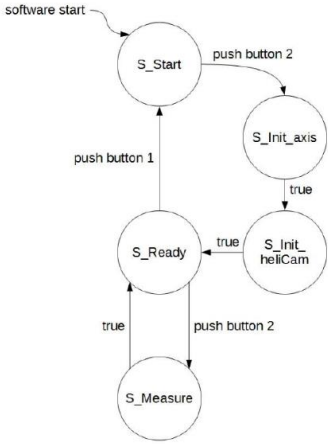| encoder cable	- comes with Lxc motor (pigtail)
motor pigtail - HD D-Sub 15 pole pins	- standard length is 1.5m
	Please contact Heliotis for custom length.
Y-cable for XENAX encoder 1 x 15 pole HD D-Sub male, 1 x 15 pole HD D-Sub female, 1 x D-Sub 9 x pole female, length 0.25m	F-Y-CABLE-D-SUB-L0.5
USB cable, length = 4.5m high-flexibility, 10 million cycles, compatible with drag chains	X-USB-L4.5-CF
GigE cable length = 5m	X-RJ45-L5-5E

10)   2D-optics with LED lighting

For applications which require 2D live view, high-resolution 2D images or color images, the WLI5 can be equipped with a 2D-module. The module consists of a high-resolution objective, LED illumination and mounting parts.
The objective is mounted in reverse, which means that the acquiring camera needs to be equipped with a second objective tuned to infinite. Please contact Heliotis for detailed information.

	heliOptics™ - 2D optics with LED lighting **WLI5.1-2D-LED** - mount compatible with WLI5.1 modules - includes a 50mm fixed objective with Locking Iris/focus for 2/3-Inch CCD, f/1.4 to f/22, reverse mount - 24V LED direct lighting - 24V LED side illumination with 8 sections

11) Software

	heliCommander™ 3.3 PX-HC3.3 Graphical User Interface and application framework supporting - 3 axis portal - heliInspect™ 3D-sensors - 2D-camera module - interactive operation - automated operation (recipes) - TCP/IP socket interface
	MountainsMap™ Imaging Topography DS-MM-TOPO - comprehensive report generation - large number of operators, e.g. surface parameters ISO 25178 and ISO 4287 - WYSIWYG report editor
	Software Development Kit heliSDK1.6 - for integration into client applications based on C++, LabVIEW®, Halcon™ or Python - available on Windows and Linux - free of charge

(B) Configuration Sheet

Function	Configuration	Selection
Interferometer module	WLI5.1-MRO-LED 60 03 10	x
Mirau objectives	LM-MIRAU-X10 90 02 10	
	LM-MIRAU-X20 90 02 20	
	LM-MIRAU-X50 90 02 50	
Cover	WLI5.1-COVER 60 03 20	
Lens tube	TB2.0-VIS 60 00 02	
Lock-in camera	C3.1.1-CP-MLO-X1 30 03 02	x
Driver electronics	D1.2.2 40 00 01	x
Scanner	J-Lxc44F608-E0.1 90 01 00	
Axis controller	J-Xvi-75V8 90 01 15	
Connecting cable	HI-CC-L1.5-ST 40 03 65	
	HI-CC-L3.0-ST 40 03 66	
	HI-CC-L5.0-ST 40 03 67	
	HI-CC-L1.5-CF 40 03 60	
	HI-CC-L3.0-CF 40 03 61	
	HI-CC-L5.0-CF 40 03 62	
Motor cable	- comes with the scanner (pigtail) - please specify required length	
Encoder cable	- comes with the scanner (pigtail) - please specify required length	
Y-cable	F-Y-CABLE-D-SUB-L0.5 90 01 50	

USB cable	X-USB-L4.5-CF 90 00 00	
GigE cable	X-RJ45-L5-5E 90 00 10	
2D-optics module (optional)	WLI5.1-2D-LED 60 03 11	
Software	heliCommander3.3 50 90 20	
	heliViewer3.2 50 90 10	X (free)
	heliSDK1.6 50 90 00	X (free)
	DS-MM-TOPO 90 04 00	