

heliInspect™

H9L

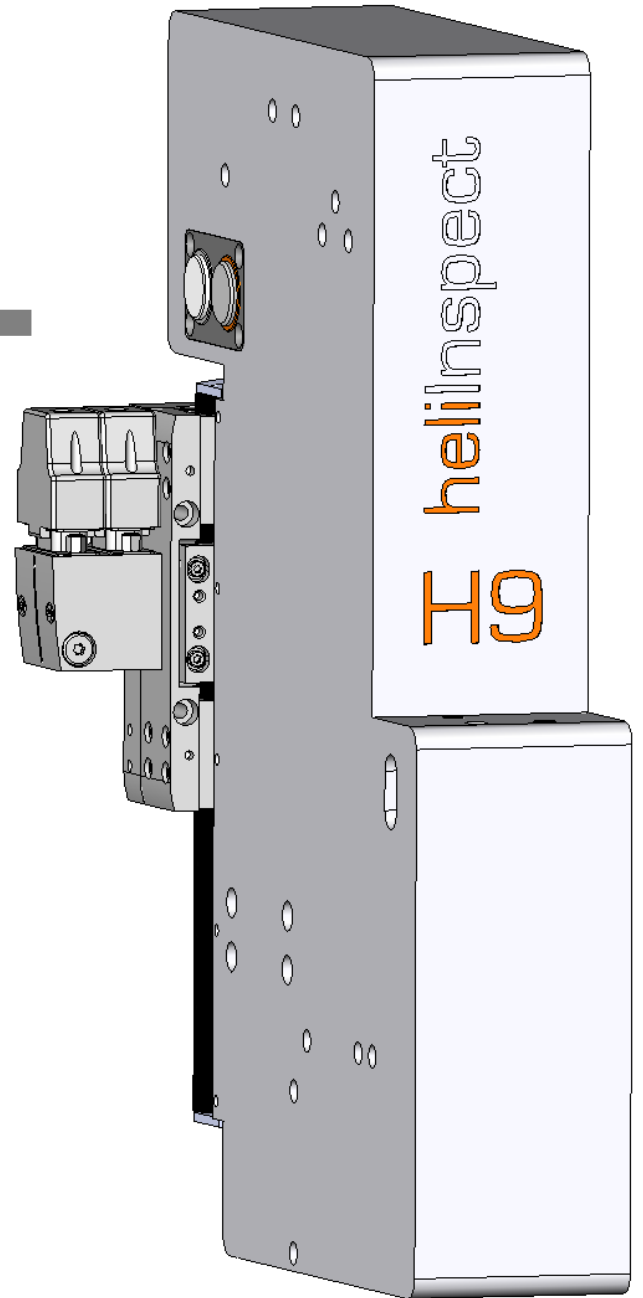


Table of Contents

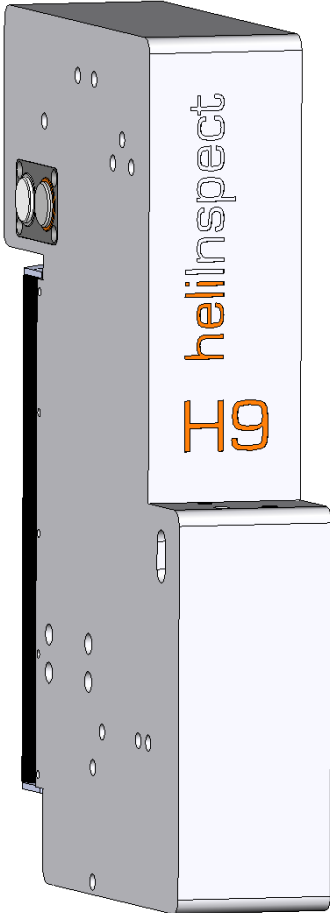
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(A) Configuration Options

1) heliInspect™ H9L 3D-Measurement Head

The heliInspect™ H9L offers high-resolution 3D profiling for inline applications that require large field of views and extralong working distances. The H9L is equipped with Heliotis' latest lock-in imager heliSens™ S4H which yields higher resolution and shorter acquisition times.

Furthermore, the H9L comes with the same advanced high-level application programming interface as the popular heliInspect™ H8 series. Thus, the effort for machine integration is reduced to a level comparable with that of a 2D camera.



heliInspect™ H9L
H9L.0-Sxx-Lxx-Xxx

Features:

- long working distance
- high-speed 3D-imager heliSens™ S4H
- high-speed camera heliBoard™ B4
- power LED with collimation optics
- integrated Michelson interferometer
- integrated dovetail mount

Product Code:

Category	xx	Description
S	40	heliSens™ S4H w/o micro lenses
L	R2	LED red, type 2
	B2	LED blue, type 2
X (*)	0.5	magnification 0.5x
	0.8	magnification 0.8x
	1.0	magnification 1.0x
	2.0	magnification 2.0x

[*] For optical characteristics, see Table 1: Optical Characteristics for available magnifications

IMPORTANT NOTE:
The H9L is configured to control the scanner directly via the XENAX motor driver (CN Z1). For other configurations, please specify "CN Z0" or contact support@heliotis.com for further information.

Table 1: Optical Characteristics for available magnifications

helinspect™ H9L	Optical Characteristics			
Magnification	2x	1x	0.8x	0.5x
Field of View [mm x mm]	6.14 x 6.53	12.29 x 13.06	15.36 x 16.32	24.58 x 26.11
Lateral Resolution [um]	12	24	30	48
Working Distance [mm]	110	113	113	113
Numerical Aperture	0.11	0.067	0.053	0.033

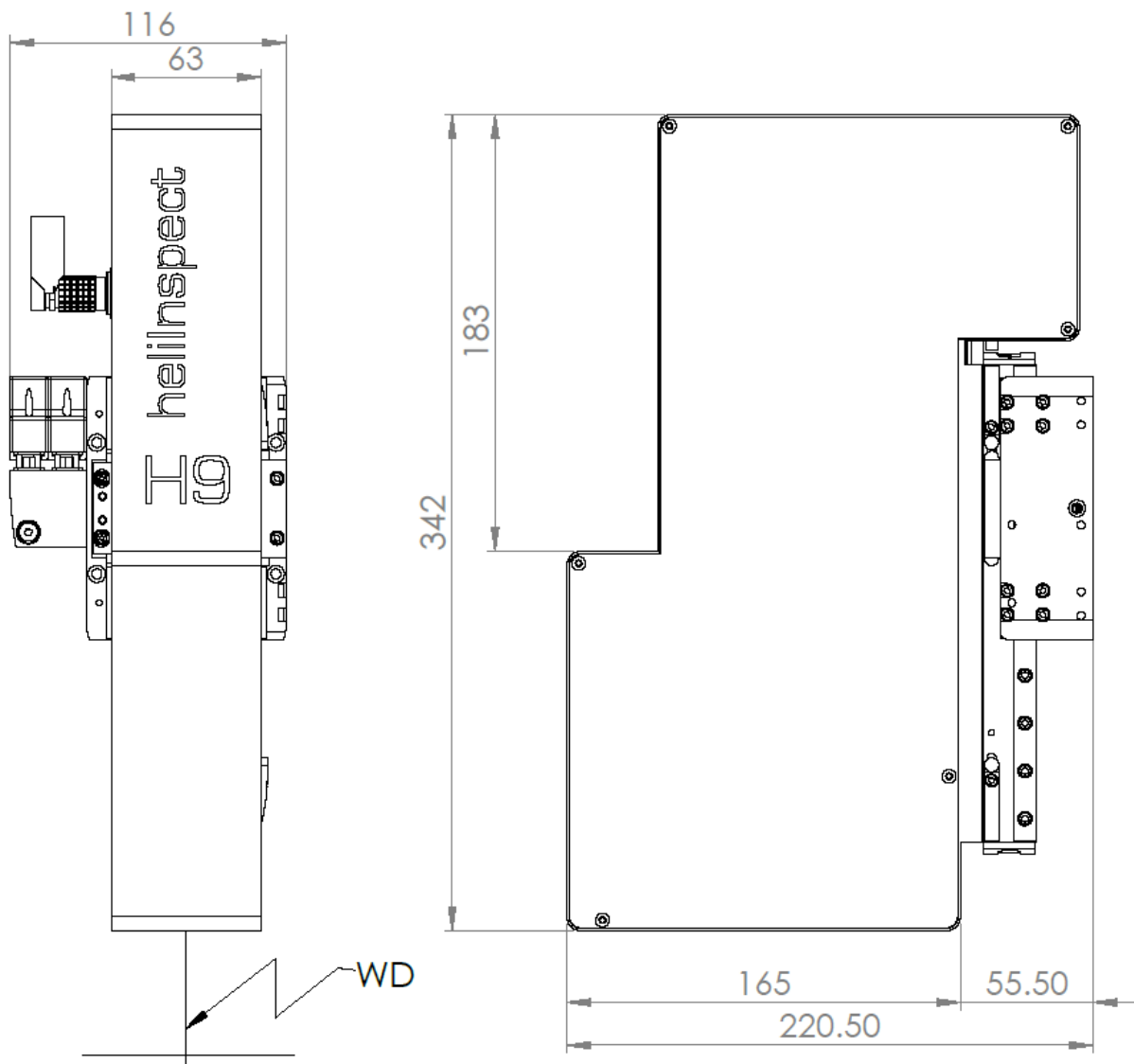
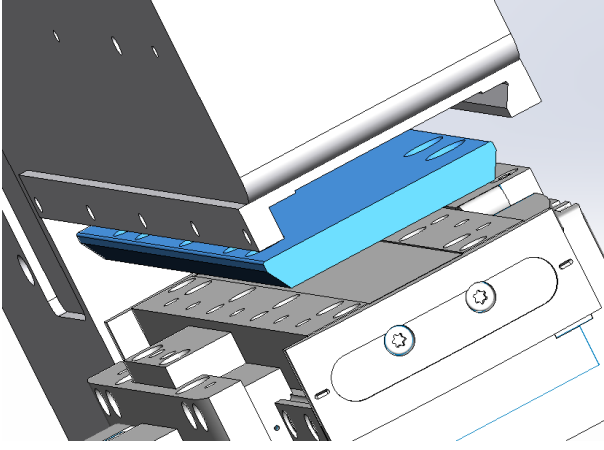


Figure 1: Technical drawing (identical for all configuration)



Adapter Plate
AP1.0-H9DT-Mxx

Features:

- dovetail mount for H9L
- hole and pin pattern for Lxu axes

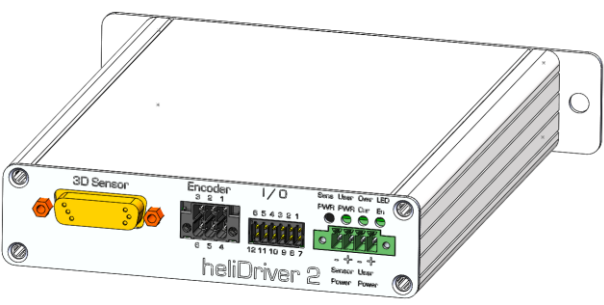
Product Code:

Category	xx	Description
M	01	compatible with Lxu40
	02	compatible with Lxu80

2) Driver Electronics heliDriver™ D2

The heliDriver™ D2 supplies the H9L measurement head with power. It also features a low-noise current source to drive the high-power LED illumination of the H9L.

For the external scanner, the D2 conditions signals for trigger and position encoders. To support a great variety of 3rd party scanners and motion controllers, the D2 can be configured to adapt to various signal levels. Default settings support the XENAX motion controllers listed below.



heliDriver™ D2
D2.1-Axx

Features:

- controlled voltage supply for the H9L
- controlled current supply for H9L LED illumination
- signal conditioning of trigger and AB encoder inputs

Product Code:

Category	xx	Description
A	2	LED driver with max 2 ampere

Note:
Please contact Heliotis in case of integration with 3rd party scanners and motion controllers.

Typically, the **heliDriver™ D2** is mounted in an electrical switch cabinet. A single cable connects the D2 to the H9L measurement head. Note that the H9L also needs to be connected to a vision PC or a switch via the HI-GE8 ethernet cable (see *Figure 2: Cabling*).

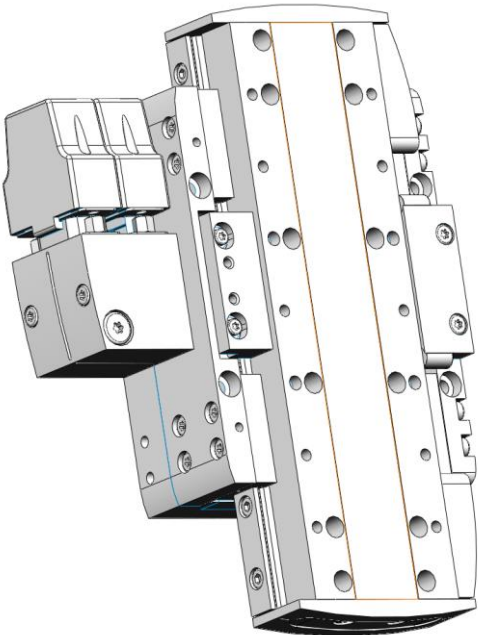
3) Scanner

The measurement principle of the **heliInspect™ H9L** (i.e. scanning white light interferometry) requires a precise axial movement. Heliotis recommends the following precision linear axes with integrated optical encoders. Their 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 include:

- 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-Lxu(xx)F60-E01

Linear motor axis with precise, self-lubrication ball bearing guide, integrated optical measurement system with 100 nm resolution

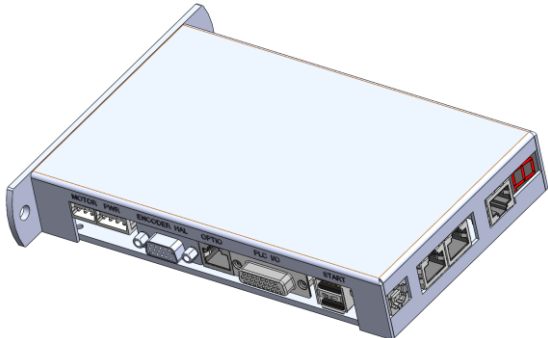
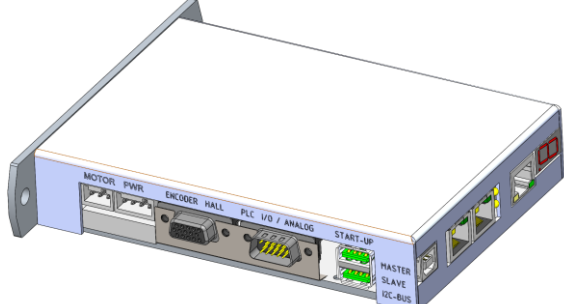
Product Code:

Category	(xx)	Description
Lxu	40	stroke of 40 mm
	80	stroke of 80 mm

	<p>Spring Weight Compensation WC1.0-Lxu[xx]-F25</p> <p>Product Code:</p> <table border="1"> <thead> <tr> <th>Category</th> <th>[xx]</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td rowspan="2">Lxu</td> <td>40</td> <td>use with Lxu40</td> </tr> <tr> <td>80</td> <td>use with Lxu80</td> </tr> </tbody> </table>	Category	[xx]	Description	Lxu	40	use with Lxu40	80	use with Lxu80
Category	[xx]	Description							
Lxu	40	use with Lxu40							
	80	use with Lxu80							

4) Axis Controller

To control the linear motor axes of the previous section, we recommend one of the servo controllers below. These models are fully supported by the Heliotis' software development kit and software applications. Optional bus modules allow for connecting to a PLC via EtherCAT, POWERLINK, CANopen, and PROFINET. Please contact support@heliotis.com for further details.

	<p>JXvi-75V8</p> <p>XENAX Servo controller with state-control and observer, S-curves profile generator incl. Web Server, Ethernet TCP/IP, RS232 and 12 Input, 8 Output 24V</p>
	<p>JXvi-48V8 [recommended]</p> <p>XENAX Servo controller with state-control and observer, S-curves profile generator incl. Web Server, Ethernet TCP/IP, RS232 and 4 Input, 2 Output 24V LINAX license included</p>

5) Cabling

The **heliInspect™** H9L system requires 7 cables:

1. The connection Cable “HI-CC8” carries power supplies, IO-signals and the LED-current.
2. The cable “HI-GE8” provides a high-speed data link to the vision PC.
3. The “Motor Cable” carries the 3-phase motor current.
4. The “Encoder Cable” carries the AB-signals for position measurement
5. The “Y-Cable” connects the AB-signals to both **heliDriver D2** and XENAX motor controller.
6. The “Trigger Cable” signals the start of a scan to the **heliDriver D2**.
7. The “GigE Cable” connects the motor controller XENAX to a PC or a PLC. With an additional bus module, the XENAX can be controlled by a PLC via EtherCAT, POWERLINK, CANopen, and PROFINET.

Cables 1 – 4 come in standard length of 1.5 m, 3 m, 5 m, 7.5 m and 10 m. Please contact Heliotis in case of different length requirements.

The figure below shows the typical wiring scheme for the **heliInspect™** H9L series.

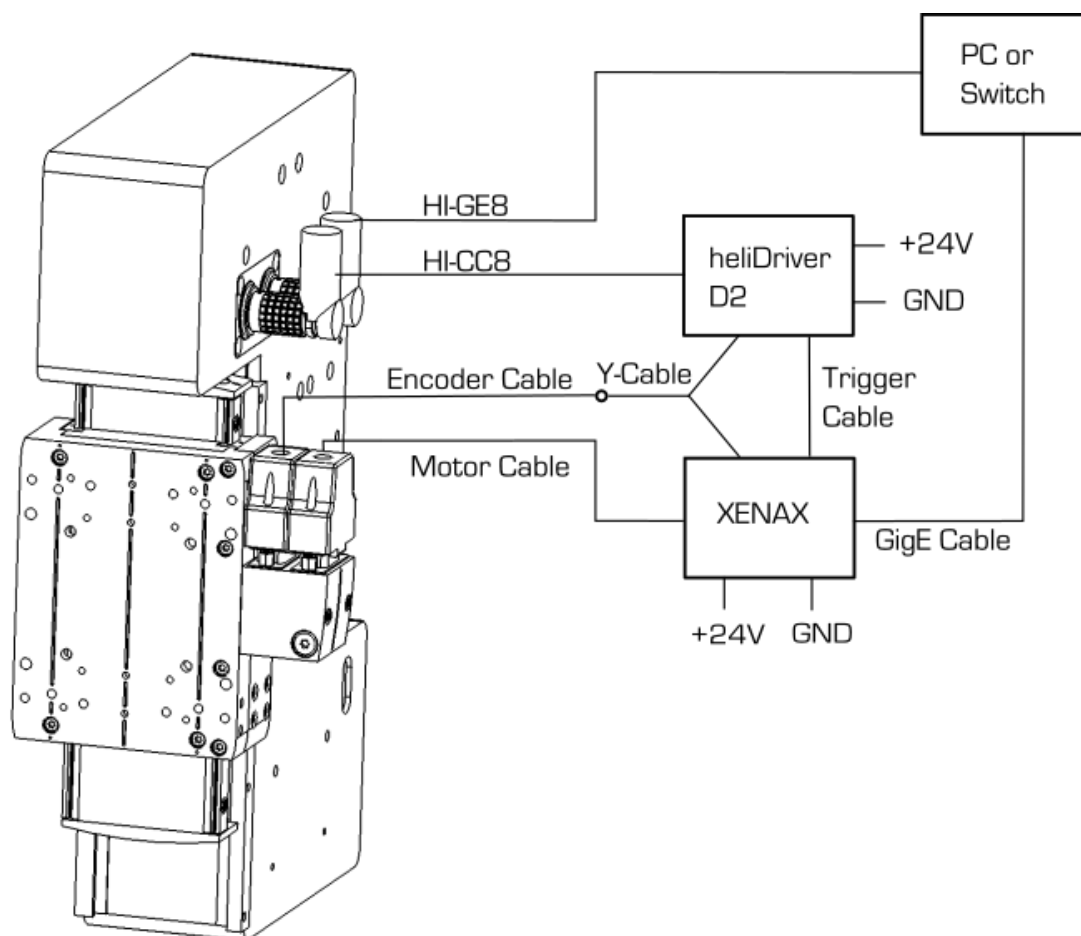


Figure 2: Cabling

Connection Cable and GigE Cable are available with straight and elbow connectors.

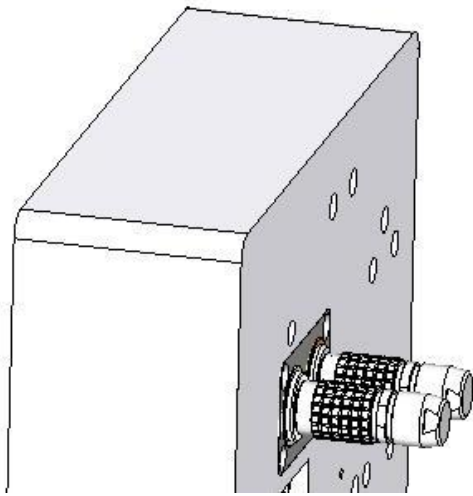


Figure 3: Straight Connectors

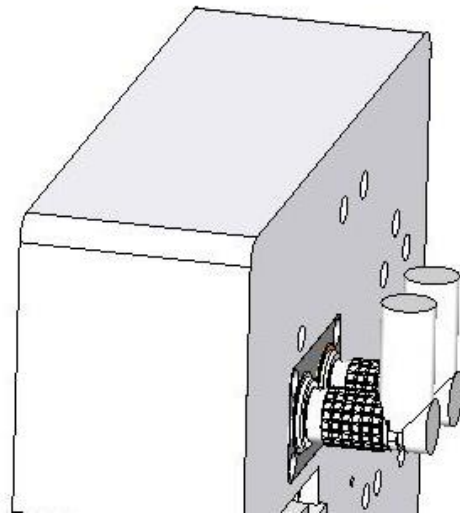
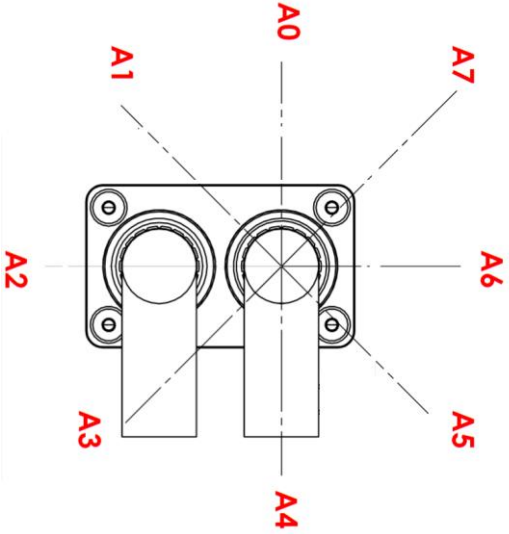




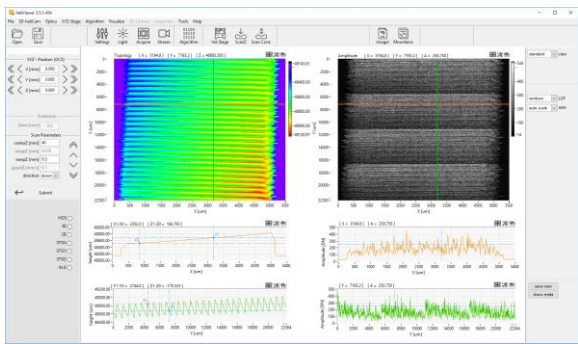
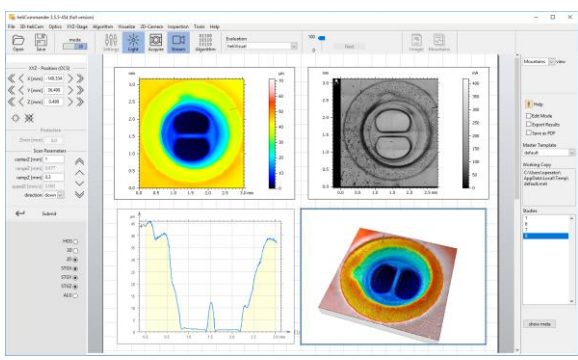
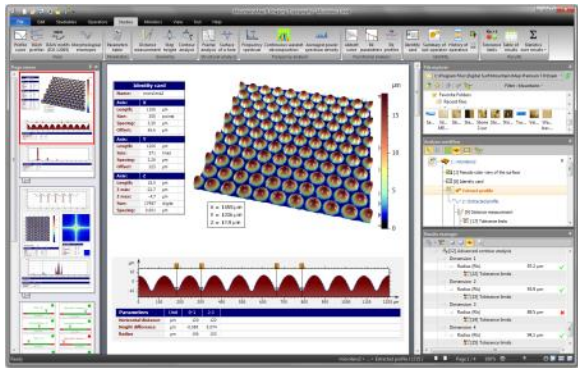
Figure 4: Elbow Connectors

	<p>GigE Cable Straight HI-GE8-Lx.x-CF</p> <p>Product Code:</p> <table border="1"> <thead> <tr> <th>Category</th> <th>x.x</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td rowspan="6">L</td> <td>1.5</td> <td>1.5 m</td> </tr> <tr> <td>3.0</td> <td>3.0 m</td> </tr> <tr> <td>5.0</td> <td>5.0 m</td> </tr> <tr> <td>7.5</td> <td>7.5 m</td> </tr> <tr> <td>10.0</td> <td>10.0 m</td> </tr> <tr> <td>x.x</td> <td>custom</td> </tr> <tr> <td>CF</td> <td colspan="2">suitable for drag chains</td> </tr> </tbody> </table>	Category	x.x	Description	L	1.5	1.5 m	3.0	3.0 m	5.0	5.0 m	7.5	7.5 m	10.0	10.0 m	x.x	custom	CF	suitable for drag chains	
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	<p>Connecting Cable Straight HI-CC8-Lx.x-CF</p> <p>Product Code:</p> <table border="1"> <thead> <tr> <th>Category</th> <th>x.x</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td rowspan="6">L</td> <td>1.5</td> <td>1.5 m</td> </tr> <tr> <td>3.0</td> <td>3.0 m</td> </tr> <tr> <td>5.0</td> <td>5.0 m</td> </tr> <tr> <td>7.5</td> <td>7.5 m</td> </tr> <tr> <td>10.0</td> <td>10.0 m</td> </tr> <tr> <td>x.x</td> <td>custom</td> </tr> <tr> <td>CF</td> <td colspan="2">suitable for drag chains</td> </tr> </tbody> </table>	Category	x.x	Description	L	1.5	1.5 m	3.0	3.0 m	5.0	5.0 m	7.5	7.5 m	10.0	10.0 m	x.x	custom	CF	suitable for drag chains	
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	<p>Cables with Elbow Connectors HI-GE8R-Lx.x-CF HI-CC8R-Lx.x-CF</p> <p>Product Code:</p> <table border="1" data-bbox="762 423 1171 719"> <thead> <tr> <th>Category</th> <th>x.x</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td rowspan="6">L</td> <td>1.5</td> <td>1.5 m</td> </tr> <tr> <td>3.0</td> <td>3.0 m</td> </tr> <tr> <td>5.0</td> <td>5.0 m</td> </tr> <tr> <td>7.5</td> <td>7.5 m</td> </tr> <tr> <td>10.0</td> <td>10.0 m</td> </tr> <tr> <td>x.x</td> <td>custom</td> </tr> <tr> <td>CF</td> <td colspan="2">suitable for drag chains</td> </tr> </tbody> </table> <p>For factory configuration, please specify the required angle with the configuration code "CN A0", "CN A1", ... or "CN A7". Default configuration is "CN A0", i.e. upwards.</p>	Category	x.x	Description	L	1.5	1.5 m	3.0	3.0 m	5.0	5.0 m	7.5	7.5 m	10.0	10.0 m	x.x	custom	CF	suitable for drag chains	
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	<p>Angle Adjustment Tool LEMO-DCP-91-001-TN</p> <p>The outlet angle of elbow connectors can be adjusted by use of the Spanners WRENCH COLLET NUTS.</p>																			

<p>D-Sub 9 pole —3x0.75mm2— Wago 3.5mm</p>	<p>Motor Cable F-LINAX-CCM-Lxx-CF</p> <p>Product Code:</p> <table border="1"> <thead> <tr> <th>Category</th> <th>x.x</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td rowspan="6">L</td> <td>1.5</td> <td>1.5 m</td> </tr> <tr> <td>3.0</td> <td>3.0 m</td> </tr> <tr> <td>5.0</td> <td>5.0 m</td> </tr> <tr> <td>7.5</td> <td>7.5 m</td> </tr> <tr> <td>10.0</td> <td>10.0 m</td> </tr> <tr> <td>x.x</td> <td>custom</td> </tr> <tr> <td>CF</td> <td colspan="2">suitable for drag chains</td> </tr> </tbody> </table>	Category	x.x	Description	L	1.5	1.5 m	3.0	3.0 m	5.0	5.0 m	7.5	7.5 m	10.0	10.0 m	x.x	custom	CF	suitable for drag chains	
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<p>HD D-Sub 15 pole jack —12x0.14mm2— HD D-Sub 15 pole pins</p>	<p>Encoder Cable F-LINAX CCE-Lxx-CF</p> <p>Product Code:</p> <table border="1"> <thead> <tr> <th>Category</th> <th>x.x</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td rowspan="6">L</td> <td>1.5</td> <td>1.5 m</td> </tr> <tr> <td>3.0</td> <td>3.0 m</td> </tr> <tr> <td>5.0</td> <td>5.0 m</td> </tr> <tr> <td>7.5</td> <td>7.5 m</td> </tr> <tr> <td>10.0</td> <td>10.0 m</td> </tr> <tr> <td>x.x</td> <td>custom</td> </tr> <tr> <td>CF</td> <td colspan="2">suitable for drag chains</td> </tr> </tbody> </table>	Category	x.x	Description	L	1.5	1.5 m	3.0	3.0 m	5.0	5.0 m	7.5	7.5 m	10.0	10.0 m	x.x	custom	CF	suitable for drag chains	
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<p>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</p>	<p>Y-Cable for XENAX Encoder F-Y-CABLE-D-SUB-PH-LO.5</p>																			
<p>Connects Xenax and heliDriver</p>	<p>Trigger cable HI-TC2-Xxx-L 1.0</p> <p>Product Code:</p> <table border="1"> <thead> <tr> <th>Category</th> <th>xx</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td rowspan="2">X</td> <td>48</td> <td>for use with Xenax Xvi48V8</td> </tr> <tr> <td>75</td> <td>for use with Xenax Xvi75V8</td> </tr> </tbody> </table>	Category	xx	Description	X	48	for use with Xenax Xvi48V8	75	for use with Xenax Xvi75V8											
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<p>CAT5 RJ45 Ethernet Cable</p>	<p>GigE Cable X-RJ45-Lxx-5E</p> <p>Product Code:</p> <table border="1"> <thead> <tr> <th>Category</th> <th>x.x</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td rowspan="4"></td> <td>3.0</td> <td>3.0 m</td> </tr> <tr> <td>5.0</td> <td>5.0 m</td> </tr> <tr> <td>7.5</td> <td>7.5 m</td> </tr> <tr> <td>10.0</td> <td>10.0 m</td> </tr> </tbody> </table>	Category	x.x	Description		3.0	3.0 m	5.0	5.0 m	7.5	7.5 m	10.0	10.0 m							
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	7.5	7.5 m																		
	10.0	10.0 m																		

6) Software

	<p>Software Development Kit heliSDK4</p> <ul style="list-style-type: none"> - GEN<i>CAM interface - for integration into client applications based on C++, LabVIEW®, Halcon™ or Python - available on Windows and Linux
	<p>heliViewer™ 3 HX-HV3.8</p> <p>Graphical User Interface for interactive operation</p> <ul style="list-style-type: none"> - heliInspect™ 3D-sensors - supports 3 axes portals (interactive) - commissioning - 3D visualization
	<p>heliCommander™ 3 PX-HC3.8</p> <p>Graphical User Interface and application framework supporting</p> <ul style="list-style-type: none"> - heliInspect™ 3D-sensors - 2D-camera module - automated operation (recipes) - 3 axes portals (automated, interactive) - MountainsMap™ plugin interface - TCP/IP socket interface
	<p>MountainsMap™ Imaging Topography DS-MM-TOPO</p> <p>Quantitative analysis of surfaces</p> <ul style="list-style-type: none"> - large number of operators, e.g. surface parameters ISO 25178 and ISO 4287 - WYSIWYG report editor - comprehensive report generation <p>For advanced addons, see www.digitalsurf.com</p>

(B) Configuration Sheet

Function	Configuration	Selection
3D-Measurement Head	H9L.O-S40-LR2-X0.5 40 42 05 CN	
	H9L.O-S40-LR2-X0.8 40 94 08 CN	
	H9L.O-S40-LR2-X1.0 40 94 10 CN	
	H9L.O-S40-LR2-X2.0 40 94 20 CN	
	H9L.O-S40-LB2-X0.5 40 95 05 CN	
	H9L.O-S40-LB2-X0.8 40 95 08 CN	
	H9L.O-S40-LB2-X1.0 40 95 10 CN	
	H9L.O-S40-LB2-X2.0 40 95 20 CN	
Driver Electronics	D2.1-A2 40 80 52 CN	
Scanner	J-Lxu40F60-E0.1 90 01 11	
	J-Lxu80F60-E0.1 90 01 10	
Adapter Plate	AP1.O-H9DT-M01 40 99 91	
	AP1.O-H9DT-M02 40 99 92	
Spring Weight Compensation	WC1.O-Lxu40-F25 90 05 26	
	WC1.O-Lxu80-F25 90 05 28	
Axis Controller	J-Xvi-75V8 90 01 15	
	J-Xvi-48V6 90 01 16	

Function	Configuration	Selection
Connecting Cable Straight	HI-CC8-L1.5-CF 40 80 61	
	HI-CC8-L3.0-CF 40 80 63	
	HI-CC8-L5.0-CF 40 80 65	
	HI-CC8-L7.5-CF 40 80 67	
	HI-CC8-L10.0-CF 40 80 69	
	HI-CC8-Lx.x-CF 40 80 60 CN	
Connecting Cable Elbow	HI-CC8R-L1.5-CF 40 81 61 CN	
	HI-CC8R-L3.0-CF 40 81 63 CN	
	HI-CC8R-L5.0-CF 40 81 65 CN	
	HI-CC8R-L7.5-CF 40 81 67 CN	
	HI-CC8R-L10.0-CF 40 81 69 CN	
	HI-CC8R-Lx.x-CF 40 81 60 CN	
GigE Cable Straight	HI-GE8-L1.5-CF 40 80 71	
	HI-GE8-L3.0-CF 40 80 73	
	HI-GE8-L5.0-CF 40 80 75	
	HI-GE8-L7.5-CF 40 80 77	
	HI-GE8-L10.0-CF 40 80 79	
	HI-GE8-Lx.x-CF 40 80 70 CN	
GigE Cable Elbow	HI-GE8R-L1.5-CF 40 81 71 CN	
	HI-GE8R-L3.0-CF 40 81 73 CN	
	HI-GE8R-L5.0-CF 40 81 75 CN	
	HI-GE8R-L7.5-CF 40 81 77 CN	
	HI-GE8R-L10.0-CF 40 81 79 CN	
	HI-GE8R-Lx.x-CF 40 81 70 CN	

Motor Cable	F-LINAX-CCM-L1.5-CF 90 01 35	
	F-LINAX CCM-L3.0-CF 90 01 36	
	F-LINAX CCM-L5.0-CF 90 01 37	
	F-LINAX-CCM-L7.5-CF 90 01 38	
	F-LINAX CCM-L10.0-CF 90 01 39	
	F-LINAX CCM-x.x-CF 90 01 58	
Encoder Cable	F-LINAX-CCE-L1.5-CF 90 01 45	
	F-LINAX CCE-L3.0-CF 90 01 46	
	F-LINAX CCE-L5.0-CF 90 01 47	
	F-LINAX-CCE-L7.5-CF 90 01 48	
	F-LINAX CCE-L10.0-CF 90 01 51	
	F-LINAX CCE-Lx.x-CF 90 01 59	
GigE Cable	X-RJ45-L3-5E 90 00 13	
	X-RJ45-L5-5E 90 00 15	
	X-RJ45-L7.5-5E 90 00 17	
	X-RJ45-L10-5E 90 00 19	
Y-Cable	F-Y-CABLE-D-SUB-PH-L0.5 90 01 82	
Trigger Cable	HI-TC2-X48-L1.0 90 05 03	
	HI-TC2-X75-L1.0 90 05 02	
Software	heliViewer 3.8 50 90 10	X (free)
	heliCommander 3.8 50 90 20	
	heliSDK4 50 90 04	X (free)
Mountains Software	DS-MM-TOPO 90 04 00	