



Operating Manual

LB 983 NightOWL II

with indiGO Software

PC Software Version 2.0.2.0
Firmware Version 1.04
12/ 2011

Id No.: 40508 BA2
Rev. No.: 05



These units are not designed for use in hazardous areas.

The units must not be repaired by any person other than Berthold Technologies service engineers or technicians authorized by Berthold Technologies.

In case of operation trouble please contact your local service organization or the central service department.

Berthold Technologies GmbH & Co.KG

Calmbacher Str. 22

75323 Bad Wildbad

Germany

Phone +49 7081 177-0

Fax +49 7081 177-100

bio@Berthold.com

www.Berthold.com/bio

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1 Prefatory Comments

1.1 Typographical conventions

The following typographical conventions will be used in this operating manual:



Caution! Danger!

➔ Important information

Menus and **options** in the **software** are printed in bold type
 The **selection of a menu item** is written as a sequence of commands, separated by a vertical line
 The names of **dialog boxes** and **parameters** are also printed in bold type
Buttons are printed in bold type inside angular brackets
Enumerations are emphasized by
Action steps are identified by

Example

Measurement, View

Device | Configuration

Filter Setting

<Start>, <Stop>



1.2 Warning signs at the instrument

	<p>Wear eye protection When using the transilluminator an eye protection (DIN EN 166) is required to prevent from UV light caused by the transilluminator.</p>
	<p>Caution Danger This sign indicates a general danger (e.g. switched power socket inside the instrument).</p>
	<p>Dangerous electrical voltage The switched power socket inside the instrument carries high voltage. Be careful when handling this device.</p>
	<p>Hot surface The excitation light source can become hot. Be careful when handling these device.</p>
	<p>Risk of squeezing When the camera is moving, make sure not to open the door due the risk of squeezing.</p>

2 Safety Instructions



Caution! This sign alerts you to important operating procedures with a potential danger of damaging the equipment and endangering your safety on disobeying. Refer to the user and instrument manuals for precautionary instructions.



This operating manual includes information and warnings that have to be observed by the user in order to ensure safe operation of the instruments.



Please do always act according to the following safety instructions, before as well as during operation of the system! Before set up and operation of the instrument it is necessary to read the instructions below as neither safe operation of the instrument nor safety of the user are guaranteed otherwise. Failure to follow the instructions may invalidate the warranty.

The instrument has been manufactured in accordance with the safety requirements for electronic and medical measuring systems. If the law lays down regulations on the installation and/or operation of sample measuring system, then it is the operator's responsibility to adhere to them.



The manufacturer has done everything possible to guarantee that the equipment functions safely, both electrically and mechanically. The user has to make sure that the instrument will be set up and installed properly to guarantee safe operation.

The instruments are tested by the manufacturer and supplied in a condition that allows safe and reliable operation.

- This equipment must be installed and used in accordance with the manufacturer's recommendations. Installation must be performed by properly trained and authorized personnel.



- The installation category is II.
- Laser light!** Do not stare into the beam.
- The instrument may only be operated by personnel who have been trained on the use of the system. It is strongly recommended that all users read this manual prior to use.



- Never put parts of your body or other devices into the instrument while the unit is in operation.**
- Remove the transportation lock before switching on the instrument.**
- Use the instrument only for the designated application.
- The instrument is designed for indoor use only.
- The instrument may not be operated at altitudes above 2000 m above sea level.
- The instrument is designed to be operated within a temperature range of 15 to 30 °C.
- The instrument is designed to be operated at a maximum relative humidity of 80 % for temperatures up to 31 °C decreasing linearly to 50 % relative humidity up to 40 °C.

- ❑ BERTHOLD TECHNOLOGIES assumes no liability for any damages, including those to third parties, caused by improper use or handling of the instrument.
- ❑ The user is responsible for connecting the instrument in accordance with the valid regulations for electrical instruments.
- ❑ Set the instrument up to ensure easy access to the mains switch.
- ❑ The mains supply voltage fluctuations must not exceed +/- 10 % of the nominal voltage. Maximum voltage to be applied is 253 VAC.
- ❑ The instrument is provided with a 3-pole grounded plug. If your wall outlet does not allow connection of a 3-pole plug, have a suitable wall outlet installed by qualified personnel or use an adapter for safe grounding. Please observe the safety specifications of the grounded plug.
- ❑ The instruments are designed according to the IEC 61010-1 or EN 610 10-1 regulations for electrical measuring systems.
- ❑ To disconnect the instrument from power the appliance coupler has to be removed from the mains.
- ❑ Do not open any instrument doors as long as the instrument is in operation.
- ❑ Service and repair work may be carried out by qualified personnel only.
- ❑ The operator may only perform the maintenance work described in this user guide.
- ❑ There are no exchangeable electrical components in the instrument. In case of malfunction call authorized service personnel.
- ❑ Use only parts described in this manual for servicing.
- ❑ Disconnect power supply before opening the instrument.
- ❑ Pull the power cord to disconnect instrument from power supply.
- ❑ Turn instrument off before pulling the power cord.
- ❑ Upon removal of the front and top parts of the housing no safety measures are in effect. Be aware of any moving parts. The interior of the instrument may reach temperatures that can cause burns. Some parts of the instrument may remain hot without visual indication for some time after the power has been turned off.
- ❑ The electronic unit of the detector generates high voltage. Do not touch it during operation!
- ❑ If you can see that the instrument has become unsafe to use, switch it off and disconnect it from power supply.
- ❑ If liquid gets inside the instruments, pull the power cord. Clean the unit or have it cleaned by an authorized service center.
- ❑ Protect yourself from electrostatic charge, as discharge could damage sensitive instrument parts, especially sensitive parts of the computer and electronics boards.
- ❑ When the lid is opened (e.g. filter change) ESD can no longer be guaranteed. To avoid any damages to the electronic parts it is recommended to take precautions (touching the metal case of a safety grounded object, wearing a grounding strap, etc.).



- The system always has to be primed with solutions recommended by the kit manufacturer.
- Use only reagents recommended by the kit manufacturer.
- Use reagents only in accordance with the kit manufacturer's instructions.
- Do not use any flammable or explosive solutions or liquids whose mixture is flammable or explosive.
- The operator is responsible for the use of reagents.**
- The instrument should be shipped in its own case. For transport all transportation locks (e.g. for the plate carrier) have to be installed.
- For instrument cleaning, please refer to the respective sections in this manual.
- Reliable instrument function can be guaranteed only when original spare parts are used.
- Pollution degree is 2.
- This instrument must not be used in areas with potentially explosive atmosphere.
- The instrument may only be used in rooms with a max. pollution degree of 2.
- When the camera is moving, make sure not to open the door due the risk of squeezing.



The tests and service work recommended by the manufacturer has to be performed to make sure that the operator remains safe and that the instrument continues to work correctly. Any service and maintenance work not described in this user guide has to be performed by authorized service personnel. Use the instruments only for the designated application.

2.1 Consignes de Sécurité

Attention! Ce symbole d'alarme, vous avertit de prêter attention aux consignes opératoires. En effet si vous ne suivez pas ces instructions, il peut y avoir un risque d'endommagement du matériel et également vous faire courir des risques pour votre propre sécurité. Il est impératif de respecter les instructions du mode d'emploi et de les respecter.



Ce mode d'emploi contient des informations et avertissements qui doivent être suivis par l'utilisateur afin de garantir un fonctionnement sûr des instruments.



Il est impératif de respecter les consignes de sécurité suivantes non seulement avant la mise en service mais aussi pendant le fonctionnement de l'appareil! Avant l'installation et mise en service de l'instrument tous les utilisateurs des appareils sont tenus de lire d'abord ces instructions de service, autrement ni le fonctionnement correct de l'appareil ni la sécurité de l'utilisateur peuvent être garantis. Ne pas suivre ces instructions de service peut invalider la garantie.

Le appareil a été fabriqué conformément aux prescriptions de sécurité en vigueur pour les appareils de mesure électroniques et médicaux. Si l'installation et/ou l'utilisation des appareils de mesure de prélèvements-échantillons sont/est soumise(s) à des réglementations prescrites par la loi, il appartient à l'utilisateur de les respecter.

Le constructeur a fait tout le nécessaire pour assurer le fonctionnement sûr des appareils (du point de vue électrique, électronique et mécanique). L'utilisateur est tenu de veiller à ce que les appareils soient installés correctement afin d'éviter toute altération de leur utilisation sûre.

Les appareils sont contrôlés à l'usine et livrés dans un état assurant la sécurité de fonctionnement.



- ❑ Les appareils doivent être mis en service et utilisés strictement conformément aux recommandations du constructeur. La mise en service est réservée au personnel formé et autorisé.
- ❑ La catégorie de mise en service est de niveau II.
- ❑ Les appareils ne doivent être utilisés que par des personnes autorisées et leur utilisation est réservée au personnel compétent. Tous les utilisateurs des appareils sont tenus de lire d'abord ces instructions de service.
- ❑ Ne mettez jamais des parties de votre corps ou des objets dans l'appareil lorsque celui-ci est en fonctionnement.
- ❑ Enlevez le verrouillage de transport avant la mise sous tension de l'appareil.
- ❑ Utilisez l'instrument uniquement pour les applications désignées compatibles.
- ❑ L'appareil est destiné uniquement pour une utilisation en intérieur de bâtiments.
- ❑ L'appareil est destiné uniquement pour une utilisation à une altitude ne devant pas dépasser 2000 m au dessus du niveau de la mer.
- ❑ L'appareil est destiné uniquement pour une utilisation dans une température ambiante comprise entre 15 et 40 °C.
- ❑ L'appareil est destiné uniquement à une utilisation sous humidité relative ambiante maximum de 80%, pour des températures allant jusqu'à 31 °C et diminue linéairement jusqu'à 50% humidité relative pour une température d'ambiance allant jusqu'à 40 °C.
- ❑ BERTHOLD TECHNOLOGIES décline toute responsabilité de dommages résultant d'une utilisation non conforme à l'emploi prévu, y compris les dommages causés à des tiers.
- ❑ Les variations sur la tension du secteur ne doivent pas dépasser +/- 10% de la valeur nominale (max. 253 VAC).
- ❑ L'utilisateur porte la responsabilité de la mise en service de l'appareil selon les prescriptions électriques en vigueur.



- ❑ L'instrument est fourni avec une fiche à 3 broches dont une prise de terre. C'est une prescription de sécurité. Il est nécessaire que cette fiche puisse être branchée sur prise reliée à la terre. Dans le cas contraire, il vous faut alors en avvertir un électricien afin d'installer une telle prise. Il ne faut pas négliger cette consigne de sécurité.



- ❑ Les appareils correspondent aux prescriptions de la norme C.I.E. 61010-1 ou EN 610 10-1 concernant les instruments de mesure électriques.

- ❑ Pour arrêter et débrancher l'instrument la fiche doit être retirée hors de la prise.

- ❑ Ne pas ouvrir le couvercle lors du fonctionnement de l'appareil. Arrêtez l'instrument avant.

- ❑ Les travaux d'entretien et de réparation devront être confiés exclusivement à des spécialistes dûment formés.

- ❑ Les travaux d'entretien uniquement décrits dans le manuel peuvent être effectués par l'utilisateur.

- ❑ Pour les travaux d'entretien, utiliser exclusivement les pièces mentionnées.



- ❑ Avant d'ouvrir l'appareil, couper l'alimentation en courant.

- ❑ Arrêter l'appareil avant de retirer la fiche.

- ❑ Si vous ouvrez l'appareil, les sécurités ne sont plus activées (capôt et parties de la façade de l'appareil). Faites attention aux parties mobiles. L'intérieur de l'appareil et certaines pièces peuvent atteindre des températures pouvant provoquer des brûlures si il y a contact. Appareil éteint, des parties peuvent rester chaudes alors qu'il n'y a pas d'indication visible de température élevée.

- ❑ **Attention: Il y a un risque d'explosion si la pile n'est pas insérée correctement. Remplacer la pile uniquement par un pile du même type ou un type de remplacement recommandé par une personne autorisée. Les piles usagées sont à éliminer conformément aux instructions et prescriptions de votre pays.**

- ❑ Positionner l'appareil de manière à ce que les interrupteurs soient accessibles.

- ❑ Si vous vous apercevez que le fonctionnement de l'appareil n'est plus sûr, il faut alors l'arrêter et le débrancher de la prise secteur.

- ❑ Si du liquide a pénétré dans l'appareil il faut immédiatement le débrancher. Ouvrir l'appareil et le nettoyer ou bien le faire nettoyer par une agence de service-après vente autorisée.

- ❑ Protégez vous des charges électrostatiques afin d'éviter de provoquer des décharges qui pourraient endommager des parties sensibles de l'appareil telles que les cartes électroniques ou PC.

- ❑ Ne pas utiliser des liquides inflammables ou explosifs ni de liquides dont le mélange est inflammable ou explosif.

- ❑ Respecter toutes les prescriptions légales concernant la manipulation des déchets biologiques, des réactifs et des prélèvements-échantillons de patients.
- ❑ **L'utilisateur assume la responsabilité exclusive de l'utilisation des réactifs.**
- ❑ Transporter l'appareil uniquement dans son emballage d'origine. Lors du transport, bloquer le support de plaques à l'aide de la vis d'arrêt.
- ❑ Pour le nettoyage de l'instrument veuillez vous référer au paragraphe correspondant dans ce mode d'emploi.
- ❑ Le fonctionnement correcte ne peut être garanti qu'à la condition que des pièces de rechange appropriées sont utilisées.
- ❑ Degré de pollution est de niveau 2.
- ❑ Ne pas utiliser les instruments dans des pièces ou à des places où il y a un risque d'explosion.
- ❑ L'appareil est destiné uniquement pour une utilisation en intérieur de bâtiments avec degré de pollution max. de niveau 2.

Afin d'assurer la sécurité de l'utilisateur et le bon fonctionnement des appareils, effectuer les travaux d'inspection et d'entretien recommandés par le fabricant. Toutes les mesures d'entretien et de réparation allant au-delà de celles spécifiées dans ce manuel sont réservées aux techniciens autorisés.

2.2 Sicherheitshinweise



Die vorliegende Bedienungsanweisung enthält Informationen und Warnungen, die vom Benutzer befolgt werden müssen, um einen sicheren Betrieb der Geräte zu ermöglichen.



Dieses Zeichen weist den Benutzer auf wichtige Punkte hin, deren Beachtung unerlässlich ist.



Die folgenden Sicherheitshinweise sind sowohl vor der Inbetriebnahme als auch während des Betriebs des Gerätes unbedingt zu beachten. Vor Inbetriebnahme des Gerätes ist es zwingend erforderlich, die Bedienungsanleitung zu lesen, da ansonsten die Sicherheit des Gerätes und des Benutzers nicht gewährleistet wird.

Das Gerät wurde in Übereinstimmung mit den Sicherheitsanforderungen für elektronische und medizinische Messgeräte hergestellt. Bestehen für die Errichtung und/oder den Betrieb von Probenmessgeräten gesetzlich vorgeschriebene Regelungen, so ist es die Aufgabe des Errichters und Betreibers, diese einzuhalten.

Der Hersteller hat alles unternommen, um ein sicheres Arbeiten der Geräte (bezüglich Elektrik, Elektronik und Mechanik) zu gewährleisten. Der Benutzer muss dafür sorgen, dass die Geräte so aufgestellt und installiert werden, dass ihr sicherer Gebrauch nicht beeinträchtigt wird.

Die Geräte sind werkgeprüft und wurden in betriebs sicherem Zustand ausgeliefert.



- Die Geräte dürfen nur von autorisierten Personen in Betrieb genommen und nur von eingewiesenem Personal bedient werden. Alle Benutzer, die mit den Geräten arbeiten, müssen zuerst diese Bedienungsanleitung lesen.
- Installationskategorie ist II.
- Die Geräte dürfen nur von dafür geschultem Personal betrieben werden. Es wird allen Anwendern empfohlen, diese Bedienungsanleitung vor Benutzung zu lesen.
- Transportsicherungen vor dem Einschalten entfernen.
- Die Geräte dürfen nur für den vorgesehenen Zweck eingesetzt werden.
- Berthold Technologies übernimmt keinerlei Gewährleistung, auch für Schäden gegenüber Dritten, die durch unsachgemäße Handhabung der Geräte hervorgerufen werden.
- Die Geräte dürfen nur innerhalb geschlossenen Räumen betrieben werden.
- Die Geräte dürfen nicht in Höhen von mehr als 2000 m über dem Meeresspiegel betrieben werden.
- Die Geräte sind dafür ausgelegt, innerhalb des Temperaturbereiches von 15 bis 40 °C betrieben zu werden.
- Die Geräte sind dafür ausgelegt, bei einer maximalen relativen Luftfeuchte von 80 % (bis zu 31 °C) betrieben zu werden, die linear auf 50 % (bei 40 °C) absinkt.

- ❑ Die Stromversorgung darf nicht mehr als $\pm 10\%$ des Nominalwertes aufweisen. Maximal sind 253 V Wechselstrom erlaubt.
- ❑ Es liegt im Verantwortungsbereich des Anwenders, dass die Geräte nach den lokalen elektrischen Vorschriften installiert werden.
- ❑ Die Geräte sind mit einem 3-poligen Netzkabel ausgestattet. Dies ist eine Sicherheitsausstattung. Wenn die Steckdose keinen 3-poligen Anschluss unterstützt, muss ein Fachelektriker eine passende 3-polige Steckdose installieren oder einen passenden Adapter zur Erdung des Anschlusses bereitstellen. Zerstören Sie niemals die Sicherheitsvorkehrungen des geerdeten Anschlusses.
- ❑ Die Geräte entsprechen den Vorschriften der IEC 1010-1 und EN 61010-1 für elektrische Messgeräte.
- ❑ Nicht öffnen, wenn das Gerät in Betrieb ist.
- ❑ Service- und Reparaturarbeiten dürfen nur von Fachleuten ausgeführt werden.
- ❑ Es dürfen nur die im Handbuch beschriebenen Wartungsarbeiten vom Anwender ausgeführt werden.
- ❑ Bei Wartungsarbeiten dürfen nur die angegebenen Teile verwendet werden.
- ❑ Vor dem Öffnen des Gerätes ist die Stromzufuhr zu unterbrechen.
- ❑ Um das Gerät vollkommen vom Netz zu trennen, kann das Netzkabel gezogen werden.
- ❑ Gerät ausschalten, bevor der Stecker gezogen wird.
- ❑ Wenn das Gerät geöffnet ist sind Sicherheitsmaßnahmen nicht mehr in Betrieb. Auf bewegliche Komponenten achten! Das Innere der Geräte kann Temperaturen erreichen, die Verbrennungen verursachen können. Einige Teile können heiß bleiben ohne sichtbare Zeichen, auch nachdem das Gerät abgeschaltet worden ist.
- ❑ An der Multiplier-Einheit liegt Hochspannung an. Nicht berühren, wenn das Gerät läuft.
- ❑ Alle gelieferten Geräte und Zusatzgeräte sind geerdet ans Netz anzuschließen. **Schutzkontaktstecker** verwenden!
- ❑ Achtung: Die interne Batterie kann bei falschem Einbau explodieren! Die interne Batterie darf nur mit dem gleichen oder einem empfohlenen Ersatzmodell von einer von Berthold Technologies autorisierten Person ausgetauscht werden. Verbrauchte Batterien müssen entsprechend den Herstelleranweisungen entsorgt werden.
- ❑ Stellen Sie das Gerät so auf, dass Sie es leicht ein- und ausschalten können.
- ❑ Bei Beeinträchtigung der Betriebssicherheit sind die Geräte abzuschalten und vom Netz zu trennen.
- ❑ Ist Flüssigkeit in das Innere des Gerätes gelangt, Netzstecker ziehen. Das Gerät öffnen und reinigen bzw. durch eine autorisierte Servicestelle reinigen lassen.



- ❑ Elektrostatische Aufladungen (z.B. durch Teppichböden) müssen beim Öffnen des Gerätes verhindert werden, da Entladungen am Gerät zur Beschädigung elektronischer Teile führen können.
- ❑ Das System muss immer ausreichend mit den vom Reagenzienhersteller empfohlenen Lösungen gespült werden.
- ❑ Es dürfen nur Reagenzien verwendet werden, die vom Reagenzienhersteller empfohlen werden.
- ❑ Reagenzien dürfen nur in der vom Reagenzienhersteller vorgeschriebenen Art und Weise verwendet werden.



- ❑ **Es dürfen keine entzündlichen oder explosiven Flüssigkeiten oder keine Flüssigkeiten, deren Mischung entzündlich oder explosiv ist, verwendet werden.**
- ❑ Es ist immer auf eine korrekte Entsorgung des Abfalls (beim Füllen/Spülen der Leitungen zu achten: Bei integrierter Abfallpumpe ist ein Behälter anzuschließen. Wenn keine Abfallpumpe vorhanden ist, muss beim Spülen/Füllen der Leitungen eine entsprechende Auffangwanne unter den Injektoren plaziert sein.
- ❑ Das Zurückpumpen der Injektorflüssigkeit darf nur dann vorgenommen werden, wenn die entsprechenden Reagenzbehälter angeschlossen sind.
- ❑ Beachten Sie alle gesetzlichen Vorschriften für den Umgang mit biologischem Abfall, mit Reagenzien und Patientenproben.



- ❑ **Die Anwendung der Reagenzien liegt im alleinigen Verantwortungsbereich des Benutzers.**
- ❑ Das Gerät sollte nur in der eigenen Verpackung transportiert werden. Beim Transport ist darauf zu achten, dass alle Transportsicherungen eingesetzt werden (z.B. die Sicherung für den Plattenträger).
- ❑ Zum Reinigen des Gerätes bitte den entsprechenden Teil dieser Bedienungsanleitungen beachten.
- ❑ Ordnungsgemäße Funktionalität kann nur bei Verwendung der Originalersatzteile garantiert werden.
- ❑ Verschmutzungsgrad ist 2.
- ❑ Das Gerät darf nicht in explosionsgefährdeten Bereichen verwendet werden.
- ❑ Das Gerät darf nur in Räumlichkeiten mit einem maximalen Verschmutzungsgrad von 2 betrieben werden.

Für die Sicherheit des Benutzers und die Funktionsfähigkeit der Geräte sind die vom Hersteller empfohlenen Überprüfungen und Wartungsmaßnahmen durchzuführen. Alle über die Betriebsanleitung hinausgehenden Wartungs- und Instandhaltungsmaßnahmen dürfen nur von autorisierten Technikern ausgeführt werden.

3 Warranty and Customer Service

3.1 Warranty Statement

The instrument is sold in accordance with the general conditions of sale of Berthold Technologies GmbH & Co KG and its affiliates and representatives.

Berthold Technologies warrants this product to be free of defects in material and workmanship for a period of 12 months from the date of delivery, ex works Bad Wildbad.

Berthold Technologies or its authorized representative will repair or replace, at its option and free of charge, any product that under proper and normal use proves to be defective during the warranty period.

Berthold Technologies shall in no event be liable or responsible for any incidental or consequential damage, either direct or indirect.

The above warranty shall not apply if:

- a) the product has not been operated in accordance with the operating manual
- b) the product has not been regularly and correctly maintained
- c) the product has not been repaired or modified by a Berthold Technologies authorized representative or user
- d) parts other than original Berthold Technologies parts are used
- e) the product and parts thereof have been altered without written authorization from Berthold Technologies GmbH & Co KG
- e) the product has not been returned properly packed in the original Berthold Technologies packaging

This warranty does not apply to any third party product involved in the application.

Berthold Technologies reserves the right to refuse to accept the return of any product that has been used with radioactive or (micro)biological substances, or any other material that may be deemed hazardous to employees of Berthold Technologies. Such products have to be properly decontaminated and marked. Before returning products to Berthold Technologies ensure the devices are properly decontaminated and the form "**Confirmation on decontamination**" is properly filled in and will be accompanying the product. (See appendix for a blank form)

Before returning products to Berthold Technologies, a returns/repair number must be obtained and clearly identified on the packing and documents. Call Berthold Technologies to get this number. Retain the original packaging for use if the instrument needs to be returned to Berthold Technologies.

3.2 Customer Service

Customer service will be provided in the first instance by the network of Berthold Technologies representatives. In the event of any problem experienced with your instrument, the first recourse should be **your local Berthold Technologies representative**. For further problems requiring hardware or software expertise, the Technical Support group at Berthold Technologies GmbH & Co KG will be available by phone, fax or email to deal with your queries. Here is their address, phone, fax and e-mail:

Berthold Technologies GmbH & Co.KG
Technical Support
Calmbacher Str. 22
75323 Bad Wildbad
Germany
Phone: +49 7081 177 114
Fax: +49 7081 177 301
Email: service@berthold.com

At the end of this manual you will find a Customer Reply Form (Appendix section). If a problem arises with the instrument which you are not able to resolve, please fill in this form. This form should then be transmitted to your Berthold Technologies representative or to Technical Support at Berthold Technologies, where it will receive early attention.

Please also make sure that you have the relevant information available before contacting Berthold Technologies. Helpful information would include:

- serial numbers, part number, revision:
see production label on instrument
- software and firmware versions
- monitor and log files (refer to the respective service manuals)

4 Quick Start

These quick start instructions provide a quick access to the program. You are guided step by step through the major program functions. The page numbers in the headers refer to the individual sections in the manual that provide more detailed information about the respective functions.

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4.1 Installation

4.1.1 Safety Instructions

Whenever you are working with UV transilluminators you have to wear safety equipment (safety glass, face protecting mask) to rule out any hazards due to ultraviolet rays. The transilluminator is designed for operation in the NightOWL and should not be operated outside the device.

4.1.2 Requirements

Please observe the following requirements when working with the NightOWL II:

- 3-5 mains outlets 230V or 115V (depending on accessories). The power consumption of the NightOWL II without PC and external devices is max. 200 W. The power consumption of the anesthesia unit with compressor is 340 W. We recommend connecting the devices to a common outlet strip with switch. This allows you to power on/off the system with one switch.
- At least 160 cm width of workplace (the load-carrying capacity of the table or the desktop should be approx 100 kg). The table or desktop should stand firmly and not wobble.
- Network connection for use of network resources (network printer, file server, etc.). Connection to the Internet is recommended, but it is not essential for operation of the NightOWL.
- If you are working with the anesthesia unit, you need in addition an oxygen low-pressure connection (medical oxygen). The connection should be designed such that a hose with 6x3 mm (internal diameter 6 mm, external diameter 12 mm) can be connected. The discharge pressure should be approx. 1 bar. The maximum flow rate is about 2 l/min.
- The anesthesia unit includes a double filter system to prevent the escape of the anesthetic. For this reason, the system has to be operated under a fume hood. For safety reasons, we recommend to provide for adequate ventilation of the premises.
- To allow ergonomic working, the NightOWL II should always be set up to the left of the PC, as the door hinges are on the left.



4.1.3 Unpacking

- Unpack the boxes and make sure you have everything. In case you discover any sign of damage on the instruments or instrument parts, notify the shipping agent and/or the distributor immediately.
Remove the transport safety devices with care!
- Provide adequate space for setting up the instruments. You need about 2 meters to set up NightOWL II, computer and printer next to each other.
- The device feet of the NightOWL II are height-adjustable to compensate for a possible unevenness of the table. By turning the device feet, their height can be adjusted to ensure a safe foothold of the NightOWL II.

4.1.4 Camera Installation

For safety reasons, the camera is delivered in a special case to prevent damage during transport. Therefore, the camera has to be installed first before it is taken into operation.

Do not turn on the NightOWL as long a no camera has been installed. After power on, the device is initialized and the camera is moved up to the home position. Thus, installation of the camera without using the IndiGO software is not possible.

If the device is transported over larger distances (e.g. in a car or truck), you have to dismantle the camera prior to the transport to rule out that the camera will get damaged. Also, remove the base plate whenever you are transporting the device to prevent damage.

USB camera (NC100u)



The NC100U camera includes a USB port to control the camera and to transfer data. The camera is delivered in a separate case which also accommodates other accessories, such as connection cable etc.

Install the camera with the type label facing the "Front" sticker and fix it using the enclosed knurled screws (3). Plug the connection cable (4) included with the camera to the left of the camera and secure it. Plug the other end of the adapter into the camera. Finally, plug the USB connector into the camera and connect the air adapter to the camera (magnet) as well as the air bellows.

This completes the installation of the camera.

Ethernet camera (NC100e, NC320e)

Due to the system design, forced ventilation is used for this camera type. A fan installed into the ventilation cap pumps air through the camera by means of a hose bellows; the air exits again on the opposite side.

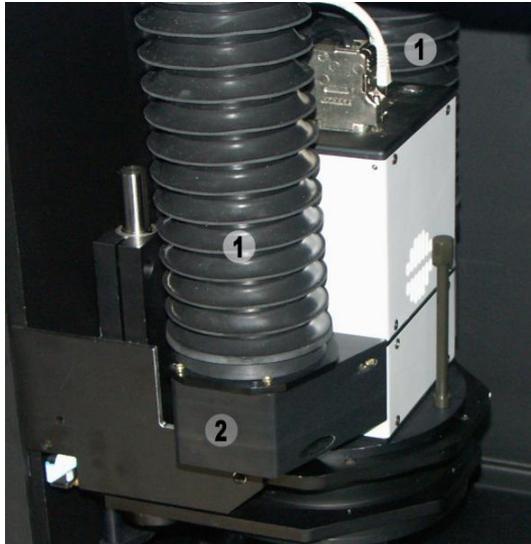
Do not operate the camera without ventilation; otherwise it may be destroyed.

To protect the camera against damage, a protective cap secured by knurled screws is installed in front of the camera. This cap has to be removed before installing the camera.

Carefully place the camera onto the camera holder with the NightOWL logo facing the front and fix it using two knurled screws to the left and right of the camera, as shown in the picture. The two bellows (1) of the ventilation are fixed to the ventilation adapter of the camera (2) using special magnet quick locks. To secure the magnet connections, a fixing screw is inserted at the side and tightened.

The Ethernet cable (RJ-45 connector) and the power supply connector (15 pole Sub-D connector) are plugged in at the upper plate of the camera. The cables are fixed to the camera

using a cable holder. The filter block of the power supply cable is fixed to the top of the camera using Velcro fastener.

**emCCD Camera (NC100em)**

In contrast to the cameras mentioned above, the NC100em does not communicate via a standard interface. This model uses a special interface card which is plugged into the PCI bus of the PC. The card is installed into a free PCI slot just like any ordinary graphics card. However, since the card requires an extra power supply, a free AMP connector, like those used for power connection of CD drives, has to be inserted into the socket on the rear side of the card. Otherwise, malfunctions may occur, since the camera is also supplied with power by the PCI card. The data connection to the computer is established with a 36-pole special cable, which either protrudes from the rear panel of the NightOWL, or with a special cable which is plugged into the rear panel of the NightOWL. The other cable end is connected to the socket which is located on the interface card in the PC.

The camera itself is fixed using the two knurled screws on the camera transport unit. The electrical connections must face the device rear panel, i.e. the interior of the housing. We recommend to fix the camera only after both plug-in connections (data cable and power connector) have been installed on the rear side of the camera. The power connector is included with the camera. It is plugged into the respective socket to the left above the camera and secured against removal by a sleeve nut. The data cable includes a self-protection mechanism which can be opened by pushing down both springs on either side of the connector.

4.1.5 Installing the Base Plate

Remove the pull-out base plate of the NightOWL II from the device for transportation. Hang up the plate at the rear bar using the two holding pins and then lower it towards the front until the plate rests with its magnetic feet on the bottom of the device.

To remove the base plate you have to lift it up about 10 cm at the front; then you can pull it out from the front.

4.1.6 Connecting

The power supply and device communication ports located on the rear panel of the NightOWL II (USB or LAN). Plug the power cord into the mains outlet (1). Next to it there is the power switch to power up the device.

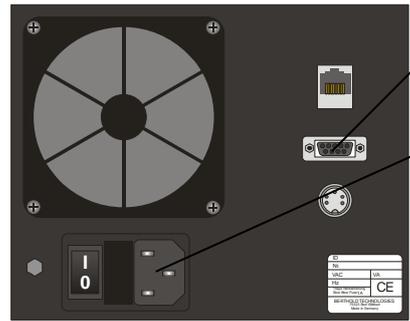
Depending on the camera used, the device communicates with the PC via Ethernet or USB. For this purpose, you have to connect the NightOWL to socket (1) on the rear panel via a RJ-45-network cable with the network interface card of the PC. It not matter if you are using a regular patch cable or a crossed patch cable (cross-over cable), since the cable type is detected automatically and the polarity is adapted.

In the USB version, you have to plug the USB cable into a free USB port on the PC. A USB A-B cable is used.

The NC100em includes, in addition to the cable connection for the NightOWL, the data cable for communication with the camera.

The 9-pole Sub-D socket on the rear panel is used for internal system upgrades and cannot be used by the user.

The 5-pole Tichel socket is an insulated line in the dark box. It can be used for separate applications, for example, to control customer-specific devices.



are

does

Check to make sure that the system voltage indicated on the instruments matches the line voltage.

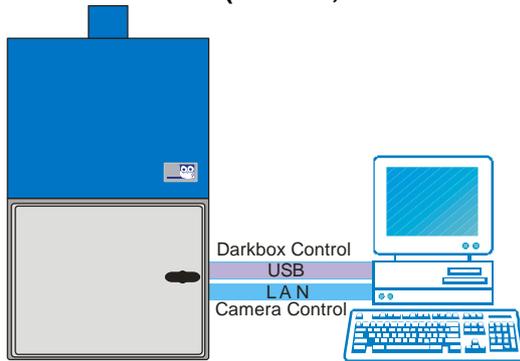
If possible, connect all devices via *one* outlet strip to the mains supply and turn the devices on.

The NightOWL is initialized after power on; a control lamp on the front panel is flashing.

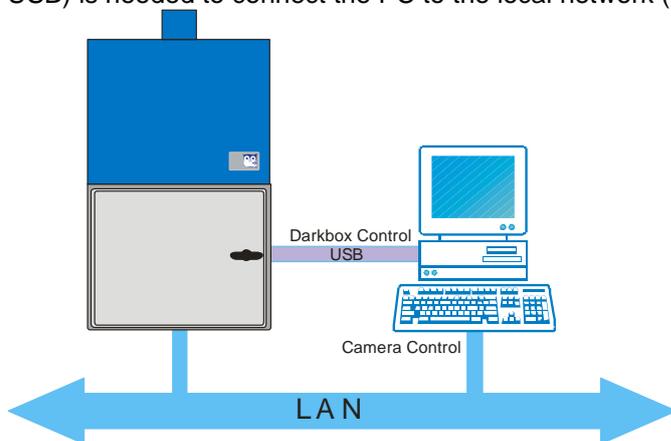
The NightOWL camera has cooled down to operating temperature after about 10 minutes and is then ready for operation.

4.1.7 Connecting to the PC

Ethernet Version (NC100e, NC320eID 40508-10; 40508-20)



An Ethernet as well as an USB-connection connection is required to control the NightOWL II with NC100e or NC320e camera and to transfer data. An additional network adapter (PCI card, USB) is needed to connect the PC to the local network (Internet access, network printer, etc.)



If the NightOWL II is connected via local network installation (wall outlets or network switch), you must observe the local IP address range to rule out possible double assignment of IP addresses of the NightOWL II.

Direct connection between NightOWL and PC is to be preferred, since interferences may occur in the network due to data traffic.

You need an Ethernet card (RJ-45) in the PC to connect the NightOWL II. Most PCs already have such a port "on board". If not, or if the network interface is already in use, you need an additional card (PCI or USB network adapter). Please consult the PC's user manual for information on how to install the network adapter.

To ensure correct operation of the NightOWL II, the network card has to be set to an IP address in the range 192.168.1.x. How to set this IP address in your operating system is described in the respective operating system user manuals.

Please keep in mind that the IP addresses 192.168.1.12 and 192.168.1.117 are already used internally by the NightOWL II.

USB Version (NC100u ID 40508-30)

Configuration of the USB version is a lot easier, thanks to 'plug and play'.

To assure the proper operation of the NightOWL device drivers are necessary. All device drivers are automatically installed through the indiGO software setup.

When connecting the instrument to PC, new devices are detected through the windows device manager. Using the automatic installation (not using the Windows update driver repository) the drivers are installed automatically. This procedure can take a while.

If after inserting / power on of the NightOWL II a 'USB -> Serial Converter' is identified instead of 'Berthold Technologies NightOWL', the NightOWL II has not yet been programmed for operation with indiGO. In this case, please contact the Berthold customer service to have the device re-programmed accordingly.

emCCD Camera (NC100emID 40508-40)

The emCCD camera includes a proprietary interface card which is available as PCI or PCI express card. This interface card has to be installed into the PC. For further information on installing additional cards please refer to your PC documentation.

The interface card requires an additional power supply in the PC which is provided via a 4-pole standard AMP connector which is also used in DVD drives. If only S-ATA power supply connectors are available you have to use an adapter.

The connection to the NightOWLII is established by means of the enclosed special cable which is plugged into the NightOWL II rear panel and on the interface card.

Once the card has been installed in the PC, it will be recognized as new hardware the next time the system is booted up again.

4.1.8 Power On

Once all cables have been connected, you may power on the NightOWL II at the mains switch. After power on, the device runs through an initialization process and all relevant components will be initialized. During this time, the LED on the front panel is flashing red.

In the course of the initialization process, the camera drive is moved up in order to find the home position. The NightOWL II is ready for operation after initialization. The camera needs about 10 minutes to reach its operating temperature. Preparative steps, such as correct positioning of the camera or setting of the fluorescence filter can be carried out already at this stage. indiGO has to be started to initialize the device and the camera (temperature) completely, since the final initialization takes place at the start of the program.

4.1.9 Software Installation

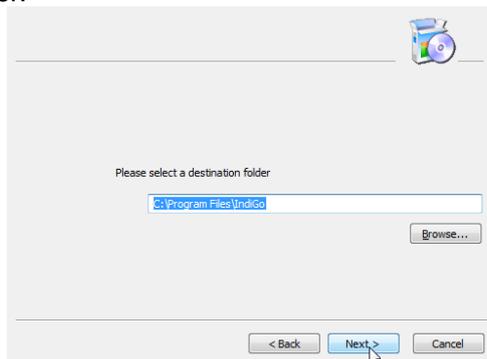
The indiGO software is included on the enclosed USB stick or CD. Keep this media in a secure place. You will need it again for program updates or new installation.

For the operation of the NightOWL the indiGO software version 2.0.1 or higher is necessary. We recommend using Windows XP SP3 or Windows 7 as operating system. Older operating systems are not supported.

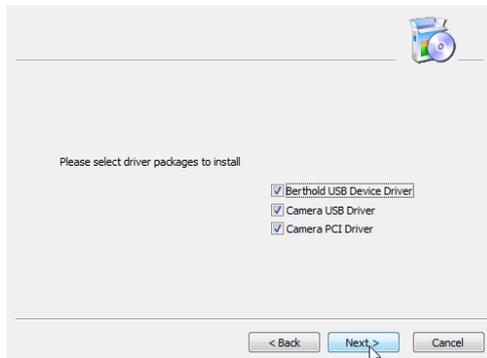
To start the installation program Click on the file SETUP.EXE on the data carrier. After launching the installation program a welcome screen appears:



After the welcome screen the folder for the software installation must be defined. If possible confirm the suggested folder.



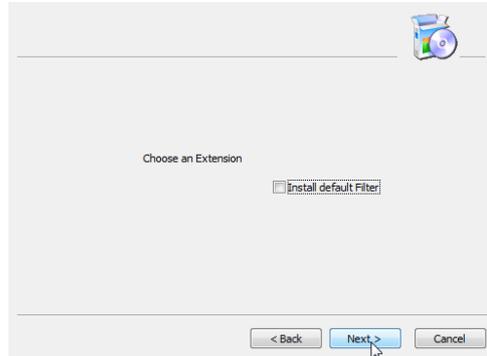
To get to the next screen asking for the drivers to be installed on the system click on 



When using a standard NightOWL 2, check the option “Berthold USB device driver” and “Camera USB Driver”. Ethernet controlled cameras only require the Berthold USB drivers.

For emCCD camera use select option “Camera PCI driver” instead of the USB camera driver. If indiGO is installed as an evaluation version only no driver installation is required.

Depending on the hardware you use, a default selection of system filters might be available and can be installed through the setup. If you want to install a set of empty default filter slider and wheel tick the box “**Install default filters**”. The default filters are empty filter sliders without any filters.



In this case the default systems filter management file will be copied to your computer. If you reinstall the software the current active systems filter management file will be overwritten.

Note: Due to the fact that the setup will install device drivers for the instrument hardware on your computer, the Windows-system might show a warning that a signature of a Windows driver cannot be verified. In this case allow the setup to install these Windows drivers.

After the installation the controller will be initialized for the first time.

If the installation was performed using an instrument specific installation media (USB Stick) the configuration procedure can be slightly different since the installer has already copied the instrument configuration to disk from the USB Stick during installation.

On Windows XP operated machines the following dialog may pop up.



In this case make sure to uncheck the box “Protect my computer...”. Otherwise the installation could fail due to insufficient access rights.

4.1.10 Instrument Controller First Time Initialization Setup

The **Instrument Controller First Time Initialization Setup** starts via the setup. Please note that this Setup will only be executed when the software is installed on a computer for the first time.



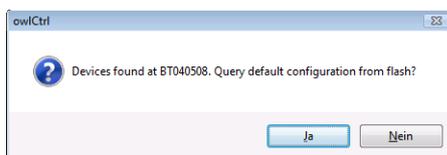
Select **Next >** to continue.



Please enter the instrument ident-number and the serial number. You can find both numbers on the back of the instrument.

You can check the instrument ident-number by starting „**Scan Devices**“. If the calibration for your device was stored on the Instrument by Berthold Technologies before it was delivered you can download the stored calibration parameters from the instruments flash memory now by confirming „**Yes**“.

*Note: In case of a demo installation without instrument connected just enter any number (as shown above) and click on **Next >**. After confirming that no default configuration was found the wizard will continue the configuration.*



If you want to recalibrate your instrument please select „**No**“.

You can load a default calibration for your instrument type via „**Load factory default settings**“. The factory default settings are chosen by the system via the given instrument ident-number.

Select **Next >** to continue.



This step of the Instrument Controller First Time Initialization Setup allows you to import further created backups of the Instrument configuration, users, filters and calibration files. If there is a backup available, chose the command that suits you best.

Select **Next >** to continue.



To maintain the instrument the instruments controller needs to create an administrator account. Please enter a name and a password for the administrator account.

Select **Next >** to continue.



On this screen you will be asked to logon in order to verify the Administrator account.

Select **Next >** to continue.



On this screen you can choose when you want to start the controller. With regular installations it is recommended to select the first option (Start controller with indiGO). The indiGO controller takes care of the hardware control and performs the measurements even when indiGO itself is not running. Choosing this option the controller will be started when indiGO is launched the first time. After a reboot it will not start automatically.

With instruments running unattended for a longer period it is recommended to choose the second option (Start controller with Windows) to have a working system even after a power failure when the PC is rebooting.

Select **Next >** to continue.



With this screen the Instrument Controller First Time Initialization Setup is completed. Select „**Finish**“, to restart and initialize the instrument controller now.

4.1.11 First Time Initialization Setup

To configure indiGO launch the software by doubleclicking on the indiGO icon.



To configure indiGO launch the software by double-clicking on the indiGO icon.

The first time initialization setup will start.



If the PC running indiGO is connected to the NightOWL directly through USB choose **“Server”** to install the instrument controller as well as the evaluation part.

In case of a network connection to a NightOWL, select **“Client”** installation.

Click  to continue.



If you run and install indiGO for the first time the first time initialization setup will create a new and empty database.

If you want to connect your indiGO installation to an existing database, you need to set up the folder to the existing database. You can browse for a suitable database location through the browse command.

Please note:

IndiGO manages all measuring data in a file-based database.

The indiGO software is able to manage the database on the local computer as well as on a network location. Therefore the database location can be set up to an individual folder.

The benefit of storage on the network is that one has access to the data from several evaluation stations, which is a major advantage in a multi-user environment.

Due to the huge amount of data indiGO does not use a server-based database like Microsoft SQL-server. Therefore the sharing of measurement data through a multi-user environment is not possible. For this reason measurement data should only be edited by one user at a time.

Old databases created with indiGO Version 1.x are not compatible. The data created with older indiGO versions or WinLight can be imported into the new indiGO database using the new indiGO software (see 6.9.3).

Click to continue.



This dialog box defines the connection to the instrument controller. If the controller is running on the same computer the default settings "LOCALHOST-1024" can be applied.

If the instrument controller is running on a remote OC in the network, please set up the corresponding IP-address or the host name like "192.168.1.2-1024" or "IMAGING_PC-1024". The IP port number to contact the instrument controller is always 1024. Host and port number must be separated with a dash "-".



IndiGO offers a user management. For the user management are three different modes available:

- **<Disable User Management>** (not recommended)
- **<Set a Default User Account>**, this user will be logged on automatically or
- User must log-in everytime the software starts.

In case no user management is required tick the box **<Disable User Management>**. No log-in is required and no user management is available. Even if you already decided to use this option the user management can be activated via the system configuration at any time.



To set up indigo to automatically logon to the database using a default user account, tick the box **<Set a default user account>**.

By selecting **<Next>** you will be asked to set up a user name and a password. Please note that the created account will have administrator rights.

Click **Next >** to continue.

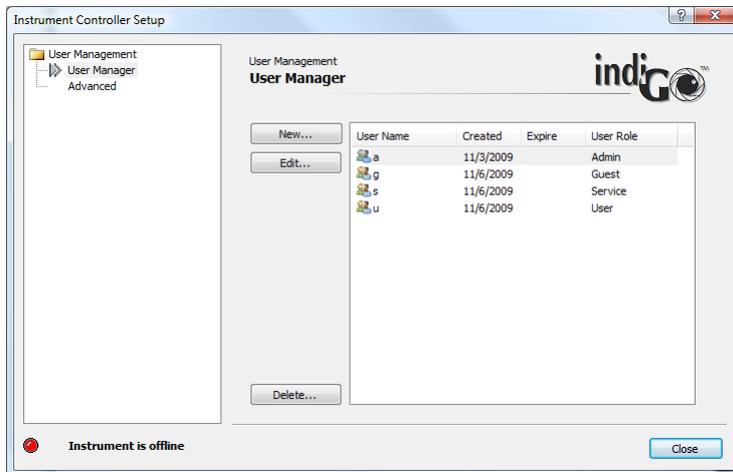
At the end of the configuration the summary page is displayed.



To end the first time initialization setup select **[Finish]**.

4.1.12 User Management

IndiGO supports an integrated user management.



The User Management can be enabled or disabled via the system administrator. Refer to the **<User Management> <Advanced>** settings to enable or disable the user management.

Only Admins can access the user management.

Users are organized in groups, so called roles. You can assign one out of four roles for each user.

- Admin
- Service
- User
- Guest

Admin

This is the system administrator role. Administrators can change all settings of the system. New users can be created and existing users can be deleted. Administrators have access to all measurements created. Administrators can change the ownership of measurements and manage invitations of all users.

Service

Service users can change all settings of the system. New users can be created and existing users can be deleted. The access to measurements is restricted through the user management. Other users can be invited to own projects.

User

Users can change any settings necessary to run measurements. Applications and templates available can be created and changed. Users can access and change the filter management. The access to the user management and any controller service functions like the system calibration is denied. The access to measurements is restricted through the user management. Other users can be invited to own projects.

Guest

Guests can run measurements in projects where they have been invited to.

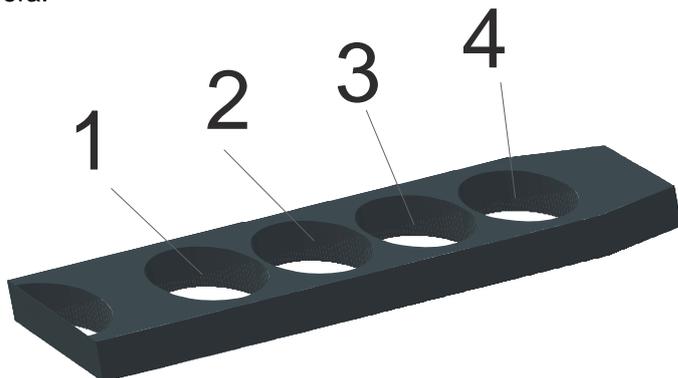
4.1.13 Installing Fluorescence Filters

The NightOWL II is equipped with automatic filter changers for the excitation and emission path. The excitation filter is located on a filter slider, which is accessible after opening the cover on the front panel of the NightOWL II. The filter slider can hold 4 excitation filters with a diameter of 25 mm (1 inch).

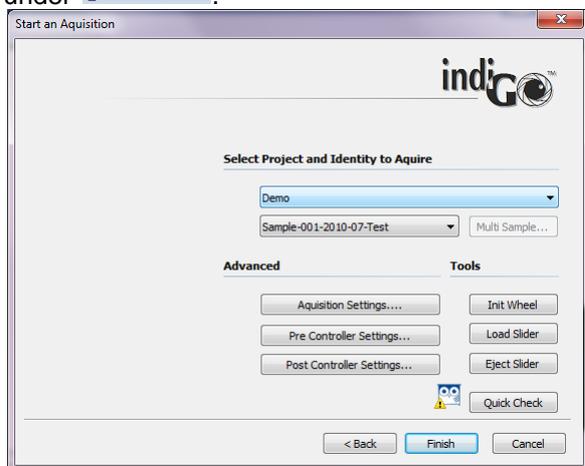
Filters that have been placed in the filter slider should be protected from above against falling out by the snap rings which are included with the device.

An arrow is printed on the fluorescence filter housing. With excitation filters this arrow should face the sample, i.e. away from the source of light.

For emission filters (filter wheel) the arrow should also face the sample, i.e. away from the camera.



The filter slider can be ejected through the indiGO software. The eject command can be found under  Start an Acquisition...



To eject the slider select .

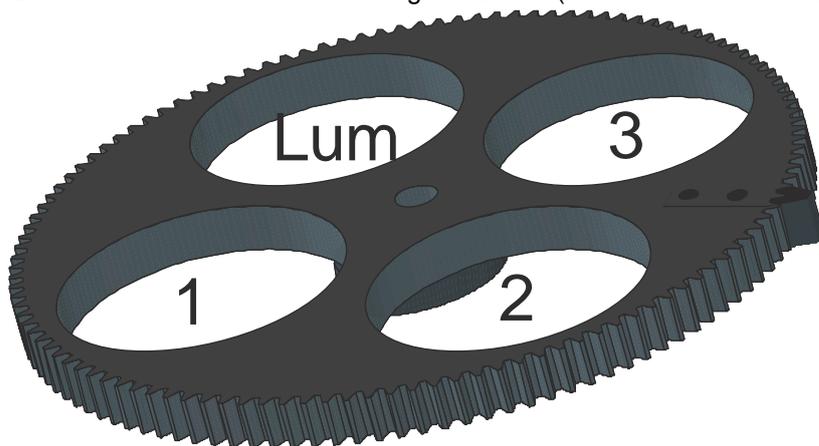
When loading the filter please observe the correct installation direction (arrow on the filter wheel).

To reload the slider select . After that the slider will be initialized by the NightOWL.

Emission Filter Wheel

The emission filters are located on a filter wheel behind the lens. A filter wheel can hold up to 4 filters with a diameter up to 50 mm.

An illustration of the filter wheel is given below (filter wheel shown from above).



The positions of the filters are numbered and identified by a respective number printed on the filter wheel.

For luminescence and photographic measurements one filter position (position 4) must be open. Using emission filters the inprinted arrow on the filter should face the sample, turning away from the camera.

To remove the filter wheel simply grab the center knob and pull out the wheel carefully. The wheel is fixed by a magnet.

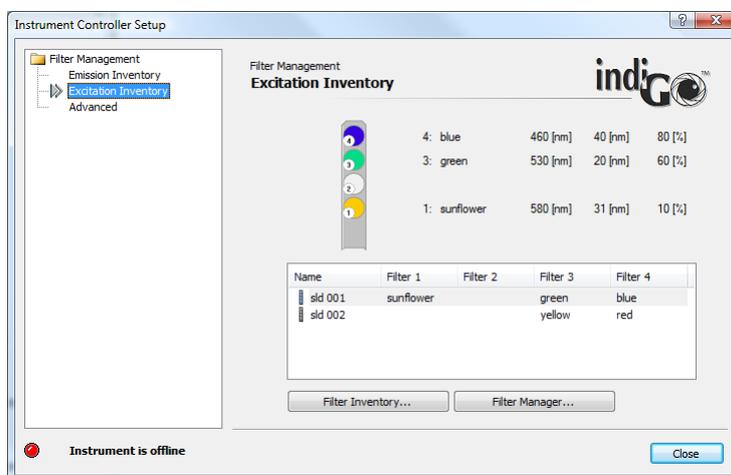
To reinstall simply slide the filter until the wheel snaps into the magnetic holder.

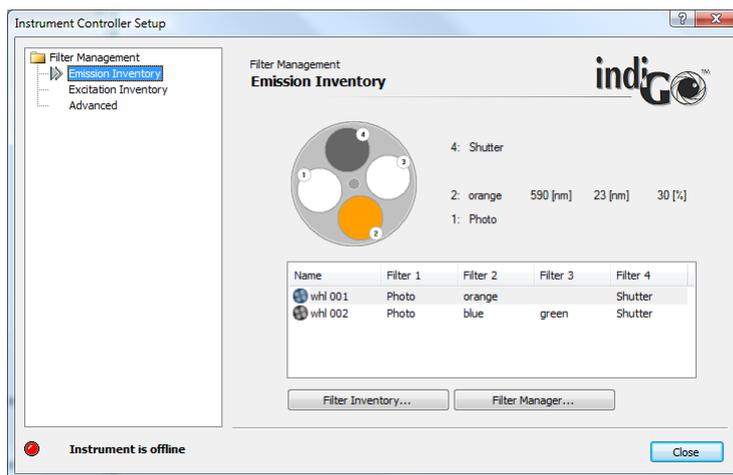
An initialization is required when the filter wheel has been replaced. To do this click on  to reinitialize the filter wheel.

Filters that have been placed in the filter wheel should be protected from above against falling out by the snap rings which are included with the device.

4.1.14 Filter Management

indiGO supports an integrated filter management. The filter management is used to describe the filter charging on the excitation filter sliders as well as the emission filter wheels.

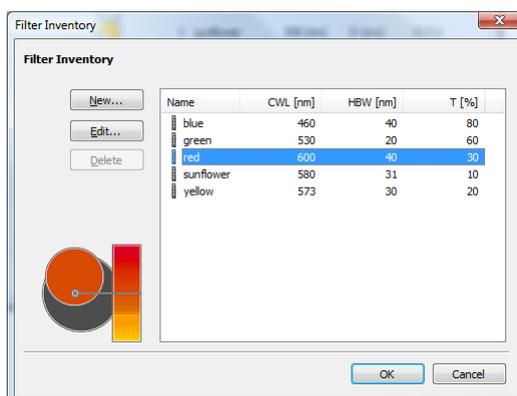




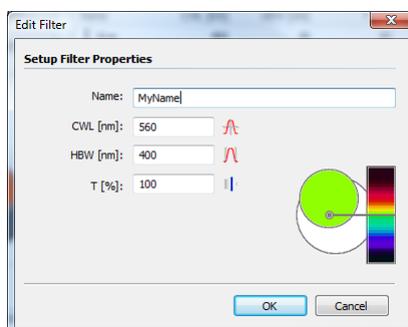
4.1.15 Filter Inventory

The filter inventory is used to describe the available filters. indiGO governs two filter inventory lists. One is used for the excitation filters, the other for the emission filters.

The inventory lists can be reached via **<Excitation Inventory> <Filter Inventory>** for the excitation filters or via **<Emission Inventory> <Filter Inventory>** for the emission filters.



To add a new filter to the inventory list, select the **<New>** command.



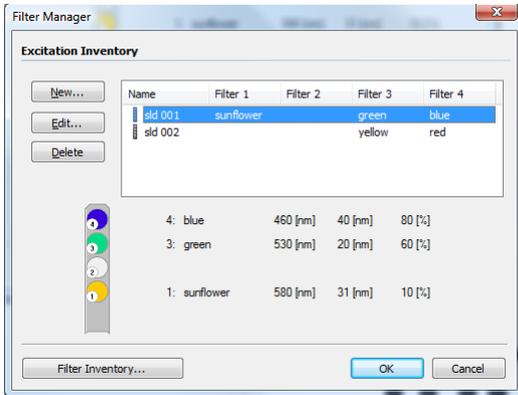
Each filter is described using the following properties:

- A name for the filter
- The center wave length of the filter
- The half band width of the filter
- The transmission

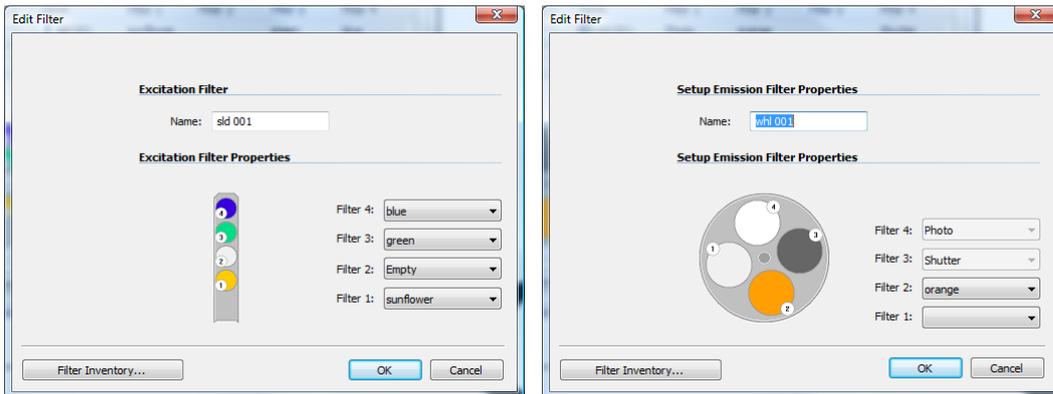
4.1.16 Filter Manager

Once a filter was added to the filter inventory list the filter can be placed on an excitation filter slider or an emission filter wheel.

The filter manager can be reached via **<Excitation Inventory> <Filter Manager>** for the excitation filters or via **<Emission Inventory> <Filter Manager>** for the emission filter.



To add a new excitation filter slider or an emission filter wheel to the manager select **<New>**. To change or edit the charging of a slider or a wheel select **<Edit>**.



The charging can be changed using the filter droplist **<Filter N>**. Please keep in mind, that only available and unused filters are displayed in the droplist. Before you can assign a new position for the filter you have to add a new filter to the **<Filter Inventory>** or to remove an existing filter from a position.

4.1.17 Filter Manager – Backup and Restore

All data from the filter manager can be exported from the system and stored to a single archive as a backup using the command **<Filter Management> <Advanced> <Export Filter Inventory>**.

A further created backup can be imported using the command **<Filter Management> <Advanced> <Import Filter Inventory>**.

4.2 First Acquisitions

4.2.1 Quick Start Glossary

Projects, Applications and Identities:

All parameters necessary to run a measurement are defined in an application. Individual probes, called identities, can be associated to a project. The project is connected to an application.

If you want to run a measurement, you have to select an identity and the system automatically refers all measurement presets from the project or application.

After the measurement is accomplished all data will be automatically transferred to the preselected identity and the project.

All acquired data is stored and organized as a structured tree. The main nodes are the projects containing identities, containing measurements.

Example:

- Project 1
 - Identity 1
 - Measurement 1
 - Measurement n
 - Identity n
 - Measurement 1
 - Measurement n
- Project n

Projects and Users

Projects can be associated to users. When created the project belongs to a specified owner. The owner has the possibility to allow other users to access the project and to run measurements on identities associated with the project. To allow other users the access to the project, the owner has to create an invitation.

At the time a project is created a mirror copy of the used application will be created and saved with the project. This means that changing the application later will not affect the project's parameters and changing parameters in the project (e.g. exposure time) has no influence on the application's parameters.

4.2.2 Launching the software

Depending on the system configuration it might be required to login after the indiGO has been started. When no other users are defined the standard log-in is as follows:

Login: Admin

Password: Admin

After log-in the main view of indiGO is shown:

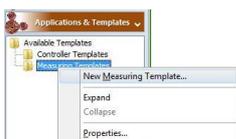


4.2.3 Defining the First Application

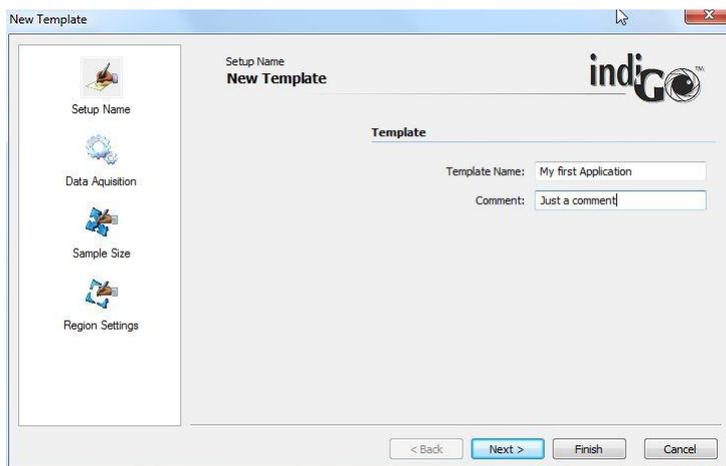
In indiGO different measurement methods (e.g. luminescence measurement, fluorescence measurement) are defined by diverse applications. For an application the measurement mode, the exposure time, the measurement sequence and the filter settings, if available can be assigned.

To set up an application in indiGO Administrator access rights are necessary. If this is not guaranteed the function to define an application is not available to rule out faulty operations.

To set up a new application refer to **<Applications & Templates>** , **<Measuring Templates>** . Select **<New Measuring Template>** from the **<Measuring Templates>** context menu.

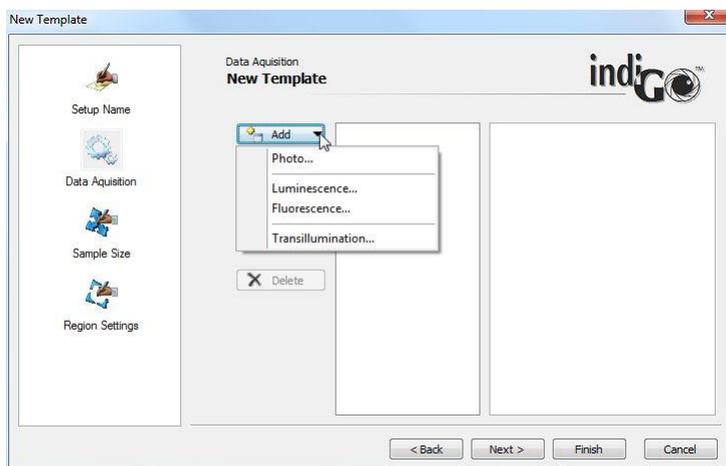


indiGO starts the wizard and you first have to enter a name for the application you want to define. You can also add a descriptive comment. Due to the windows file and path name conventions special characters such as < > ? " : | \ / * . are not allowed.

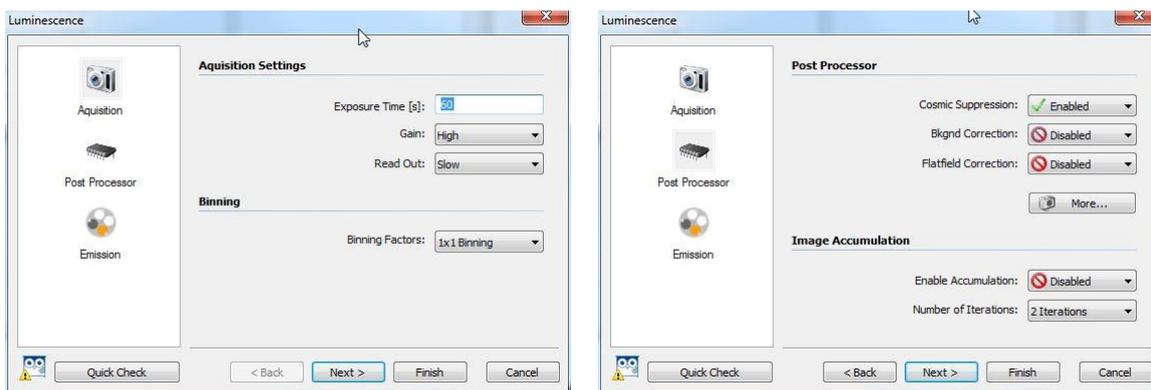


Select **Next >** to define the measurement workflow.

Four different kinds of measurements can be performed. Please note that depending on the system configuration some of the selections might not be possible (e.g. due to a missing fluorescence module).



- **Exposure Time**
is the time when the CCD chip is exposed to the sample
- **Gain**
is an internal conversion factor. Low Gain offers high dynamic range while high gain gives higher intensity numbers but limited dynamic range.
- **Read out**
defines the speed to read out the camera. High speed is recommended for photographic images, high intensity measurements of fluorescence images since a higher background noise will be obtained. Low speed is ideal for highest sensitivity luminescence measurements but the camera readout can take up to 15 seconds.
- **Binning Factor**
is the combination of neighbouring CCD pixels during readout. The result is an increased signal and thus an improved sensitivity and a better signal-to-noise ratio, however, at the cost of loss in spatial resolution.

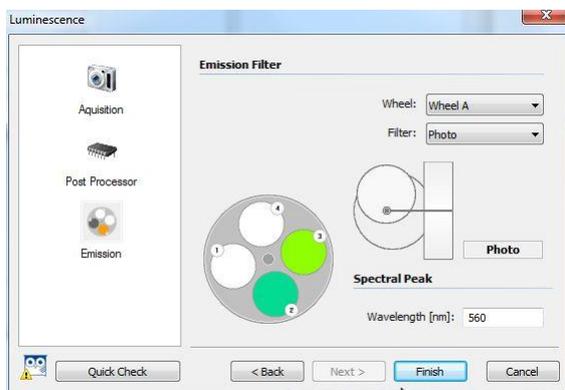


The Post Processor page offers additional image processing features which can be performed after the exposure to increase the image quality.

- Cosmic suppression**
 is an imaging filter to get rid of small high intensity pixels caused by cosmic ray during the exposure.
- Background Correction**
 subtracts a specific amount of counts from the current image. The background is calculated using the lowest intensities on the image.
- Flatfield Correction**
 corrects the uneven image caused by the vignetting of the lens

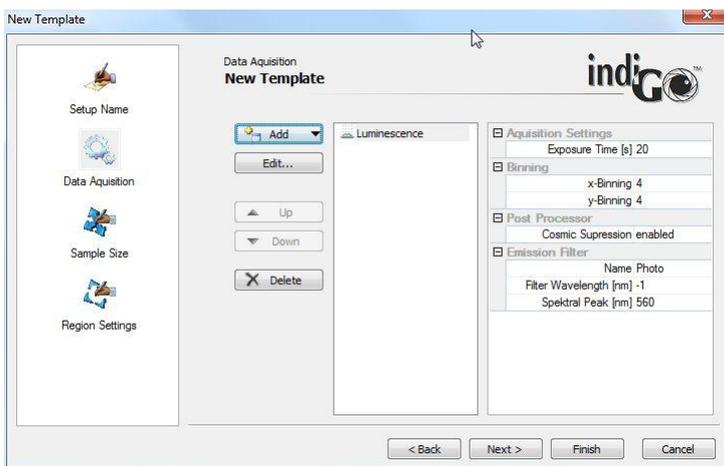
Just enable the cosmic suppression to avoid cosmic spots during longer exposures. Clicking on the **More...** button will open the parameter box to adjust the image processing filters.

Since luminescence is measured no filter is necessary. That requires the selection of the empty / photo position in the emission filter settings. To ensure a proper energy calibration check the wavelength mentioned in the input box.

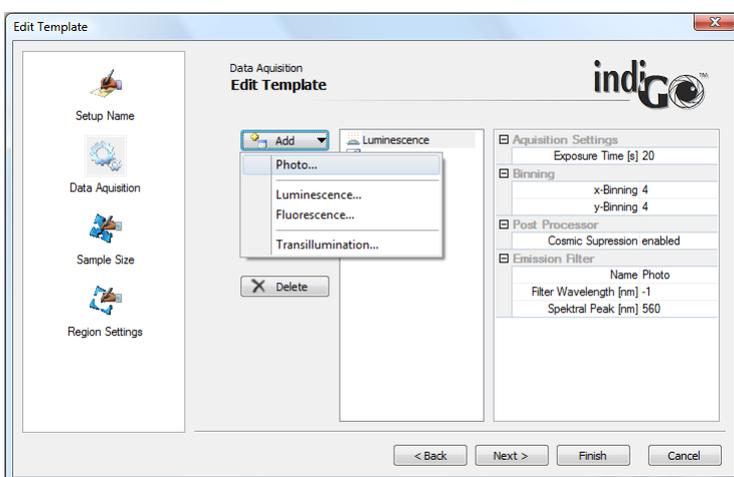


To close the luminescence parameter wizard select **Finish**.

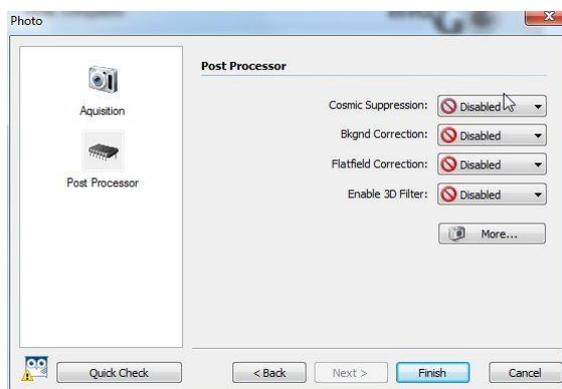
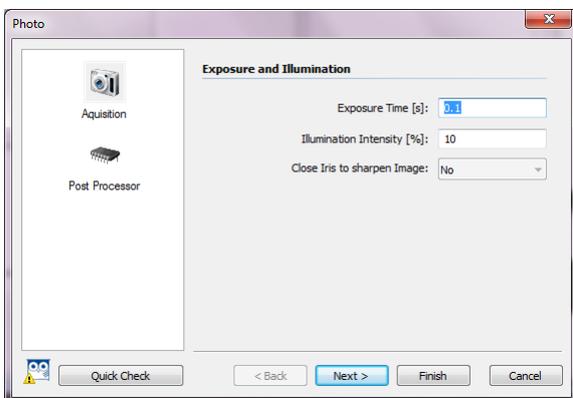
The summary of the new created luminescence measurement is given:



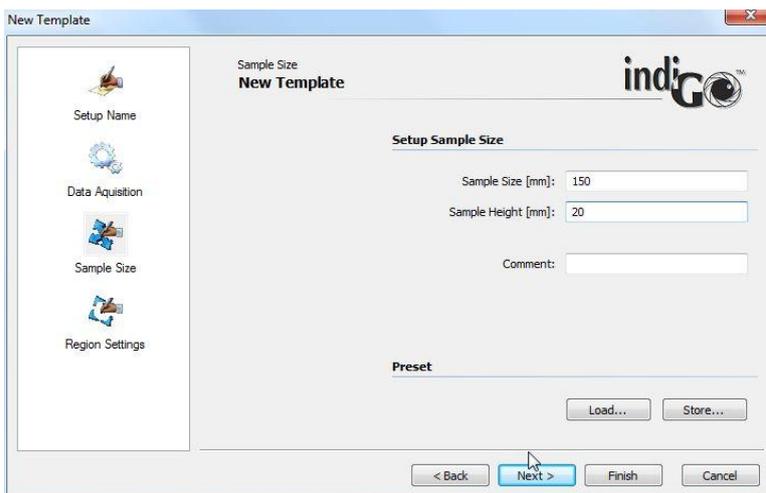
To insert a photographic exposure to the list of measurements select **<Add>**, **<Photo>**.



The default parameters (100ms exposure time, 10% illumination intensity) can be used for most applications. Disable all Post Processors in the corresponding section. The “close iris” feature will improve image quality (depth of focus). This feature is only available on few systems. To close the photographic parameter wizard select **Finish**.



To get to the sample size definition dialog box select **Next >**.

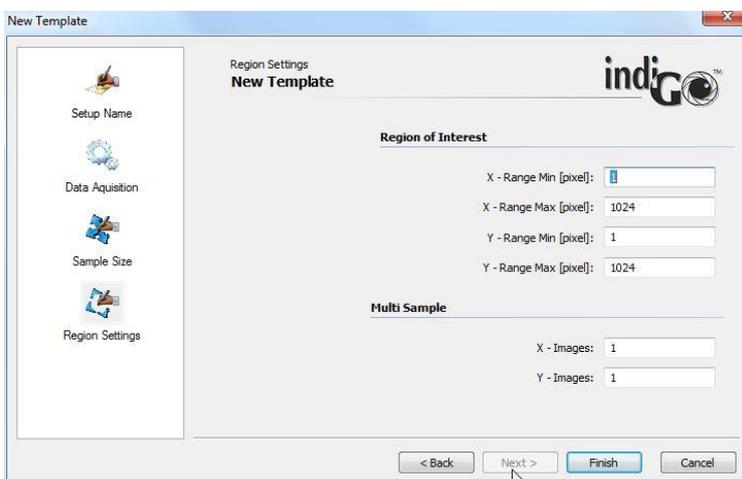


You can either select an already existing format using the load button or define a new sample format. The following parameters are required:

- Sample Size:**
The sample size refers to the image size (width) in mm. To make sure that the sample will be measured completely it is recommended to define the image size a little bit larger than the actual size of the sample
- Sample Height**
The sample heights refers to the focus height. If you are measuring flat samples (gels, blots) located on the base plate the sample height is 0 mm. If elevated samples are measured (e.g. animals or plants) the sample height has to be set to a relevant range (e.g. height of a special leaf). If you are analyzing animals, it is advisable to use half the height of the animal as sample height. If you are working with sample holders or other extra parts (e.g. transilluminators), you have to take their height into account when calculating the sample height.
- Comment:**
You can enter a comment on the sample format which describes the format.

The **Quick Check** can be used to start an acquisition using the entered values. The result is shown in a preview where you can check the focus or whether the entered sample size is adequate for the acquisition of the sample.

To go to the next page select **Next >**.



On this page you can set up the “Region of Interest” settings as well as the “Multi Sample” parameters.

By using the “Region of Interest” a section of the CCD chip can be defined to get faster framerates. By default the whole chip area is used which is 1 to 1024 in X and Y.

The MultiSample feature allows the possibility to split the image into sections. Each section is treated as a single sample identity. This feature might be useful for animal imaging in case that more than one animal at a time is measured. The X-Images and Y-Images define the amount of samples in X and Y direction. This feature is limited to 5 images in each direction (max 25 sample-ID’s per measurement).

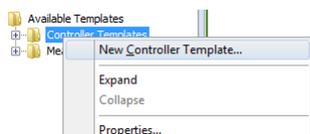
To close the application wizard select .

4.2.4 Defining a Controller Template

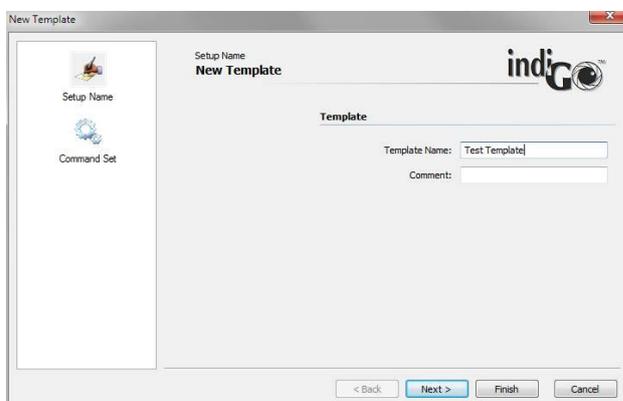
When creating a controller template the workflow is about the same than with a measurement sequence. The difference is that no measurements are performed. The controller templates are mainly used to control the LED panels in order to simulate environmental parameters (day night cycle). That's why only control commands can be set in the template.

To set up a new controller template refer to **<Applications & Templates> <Measuring Templates>**.

Select **<New Controller Template>** from the **<Controller Templates>** context menu.

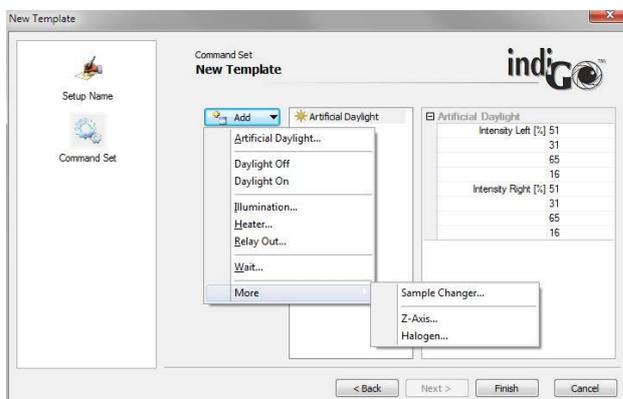


indiGO starts the wizard and you first have to enter a name for the controller template you want to define. You can also add a descriptive comment.

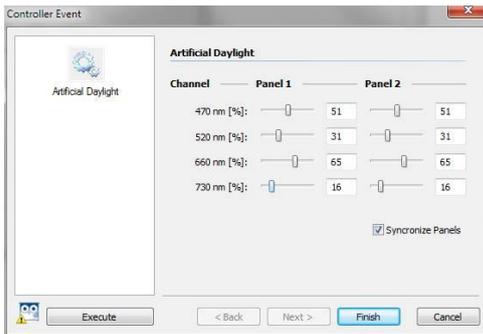


Select **Next >** to define the control workflow.

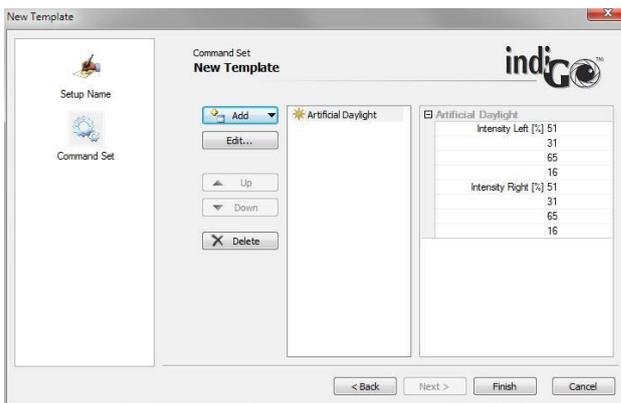
Different kinds of control actions can be performed. Please note that depending on the system configuration some of the selections might not be possible (e.g. due to a missing LED illumination).



To turn on the LED illumination select **<Artificial Daylight>** from the list. The dialog box to adjust the intensities of the different wavelength channels will pop up.

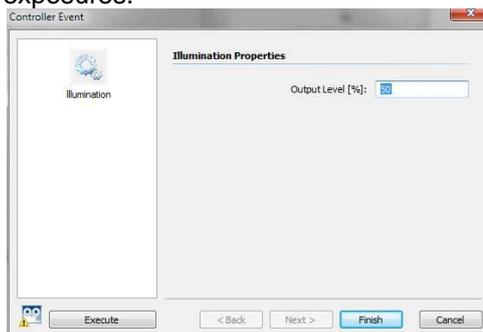


Adjust the required intensities and click on **Finish** to accept the parameters. The control command will show up in the work flow list.



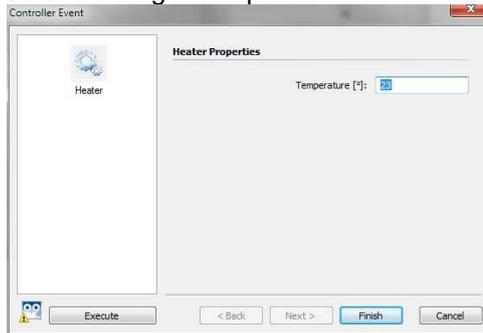
When all commands are set close the dialog box and save the template by clicking on **Finish**. Please note that while a control sequence is running no measurements can be performed. To simulate a day/ night cycle several templates with single commands must be defined to allow measurements inbetween the control steps.

- **Artificial Daylight (Not available on NightOWL systems)**
This command sets the LED illumination panel to a defined intensity. The used intensities are temporarily saved for future use.
- **Daylight Off (Not available on NightOWL systems)**
Turns off the LED Panels. Should be added to a project as Pre-Measurement action to make sure the artificial daylight is off while measuring.
- **Daylight On (Not available on NightOWL systems)**
Turns on the LED panel using the last used intensities defined through the Artificial Daylight command. Should be added to a project as Post-Measurement action to make sure the artificial daylight is turned back on after a measurement.
- **Illumination**
Controls the intensity of the white or infrared LEDs in the dark room for photographic exposures.



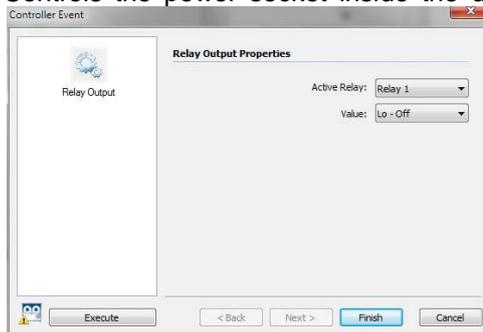
- **Heater**

Sets the target temperature of the temperature controlled measuring table (Option).



- **Relay Out**

Controls the power socket inside the dark room (Relay 1). Relay 2 is not used yet.

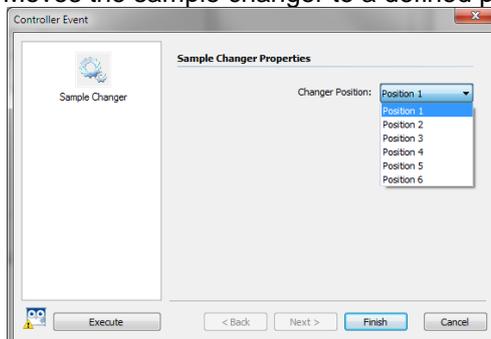


- **Wait**

Defines a waiting time within the control sequence. No other action is possible while waiting.

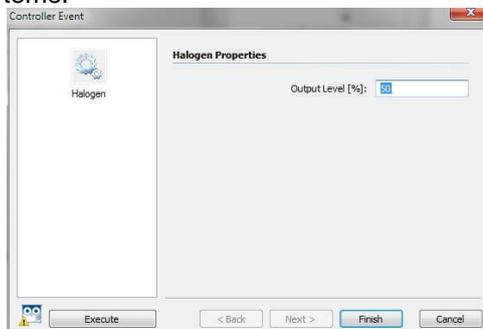
- **Sample Changer (Not available on NightOWL systems)**

Moves the sample changer to a defined position.



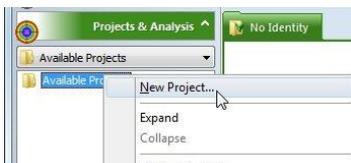
- **Halogen**

This command will turn on the fluorescence illumination. Only available with xxFlu systems.



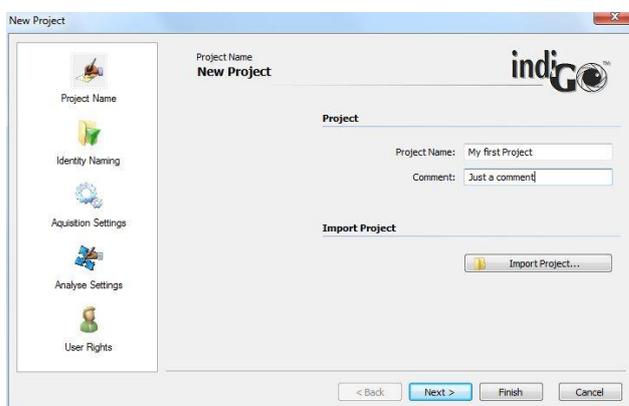
4.2.5 Defining the First Project

To define a new project refer to **<Project & Analysis>**, **<Available Projects>**.
Select **<New Project >** from the **<Available Projects >** context menu.



Projects are used to define non measurement-specific parameters, like user access rights, scale settings, etc.

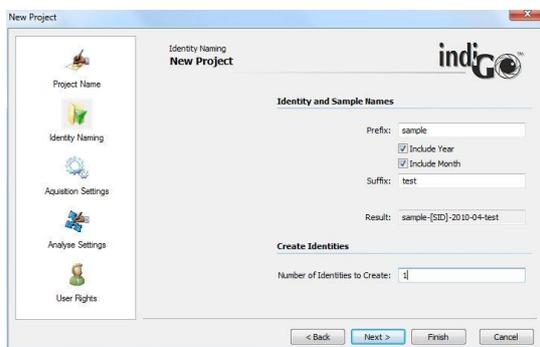
To create a new project indiGO starts the wizard:



The following parameters are necessary:

- Project Name:**
Enter the project name under which the project is to be saved. Due to the windows file and path name conventions special characters such as < > ? " : | \ / * . are not allowed.
- Comment:**
Enter a comment which describes the project.

To go to the next page select **Next >**.

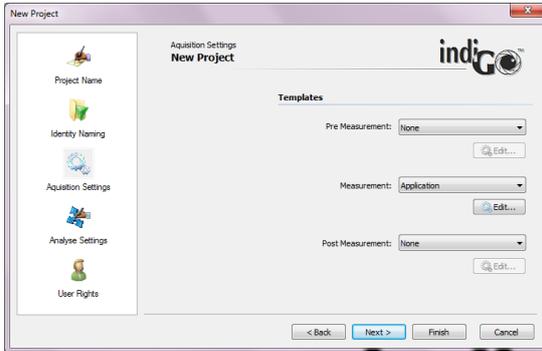


In this page you can predefine the sample identities and the sample names.

A prefix, the current year and month, the 3 digit sample ID counter as well as a suffix can be specified if required. The resulting sample ID name can be seen under “Result”. The box “Number of Identities to Create” defines the amount of sample identities which will be created. More ID’s can be added to the project later, if necessary.

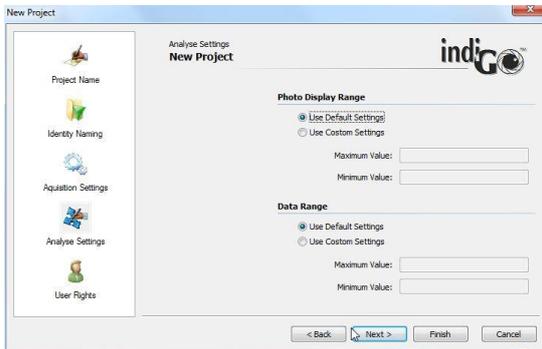
To go to the next page select .

On this page you can select the “Acquisition Settings” used for the project.



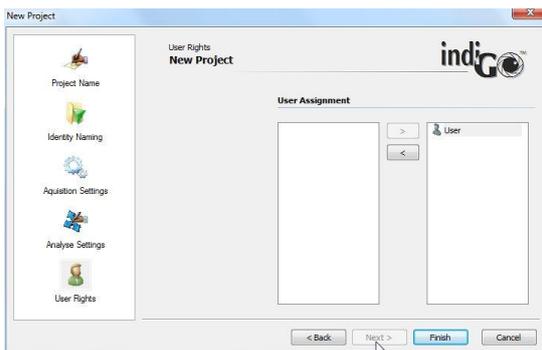
You can define a “Pre Measurement” and a “Post Measurement” template to be executed before and after the measurement. Under “Measurement” you select the application template used to run the measurement.

To go to the next page select .



The display ranges for the b/w photographic and colored signal (data) image can be defined on this page. If “Use Default Setting” is selected the system will calculate default values based on the photograph and the measured data. Individual settings for the minimum and maximum values can be selected in the “Use Custom Settings” mode.

To go to the next page select .



On the last page you can assign users to the project. The projects creator automatically receives ownership for the project. Other users can be added to the project. To create new users refer to the indiGO user manager.

All defined users are listed in the left column and can be added to the project using the add command (➔). All users assigned to the project are listed in the right column; Users can be removed using the remove command (➡).

Users assigned to the project are authorized to accomplish measurements for the project. Users, defined as “**users**” can’t change the measurement settings for the project.

For users defined as “**guests**” the access to measure is denied.

To complete the project definition wizard select  .

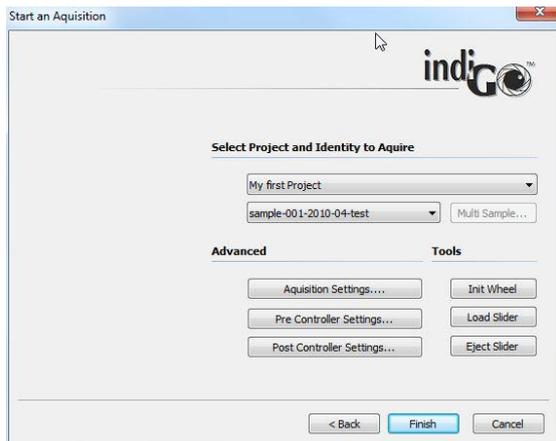
4.2.6 The First Acquisition

The system can carry out measurements on demand or scheduled using a time table.

In the first step it is a lot easier to create your first acquisitions on demand. Further details about how to use the scheduler can be found at the end of the chapter.

To start an acquisition refer to **<Acquisition & Scheduling> <Start an Acquisition>**.

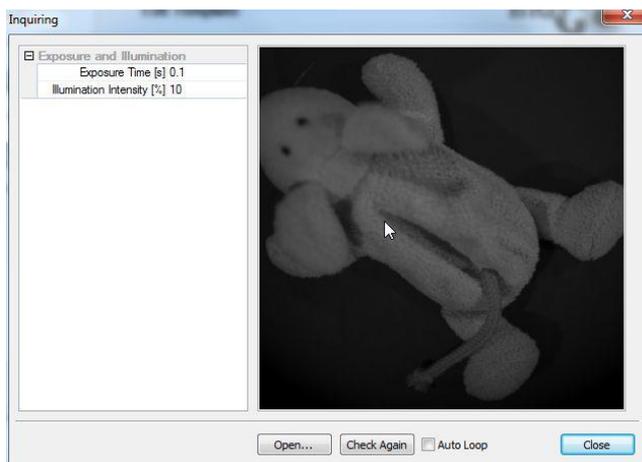
The acquisition wizard will be shown:



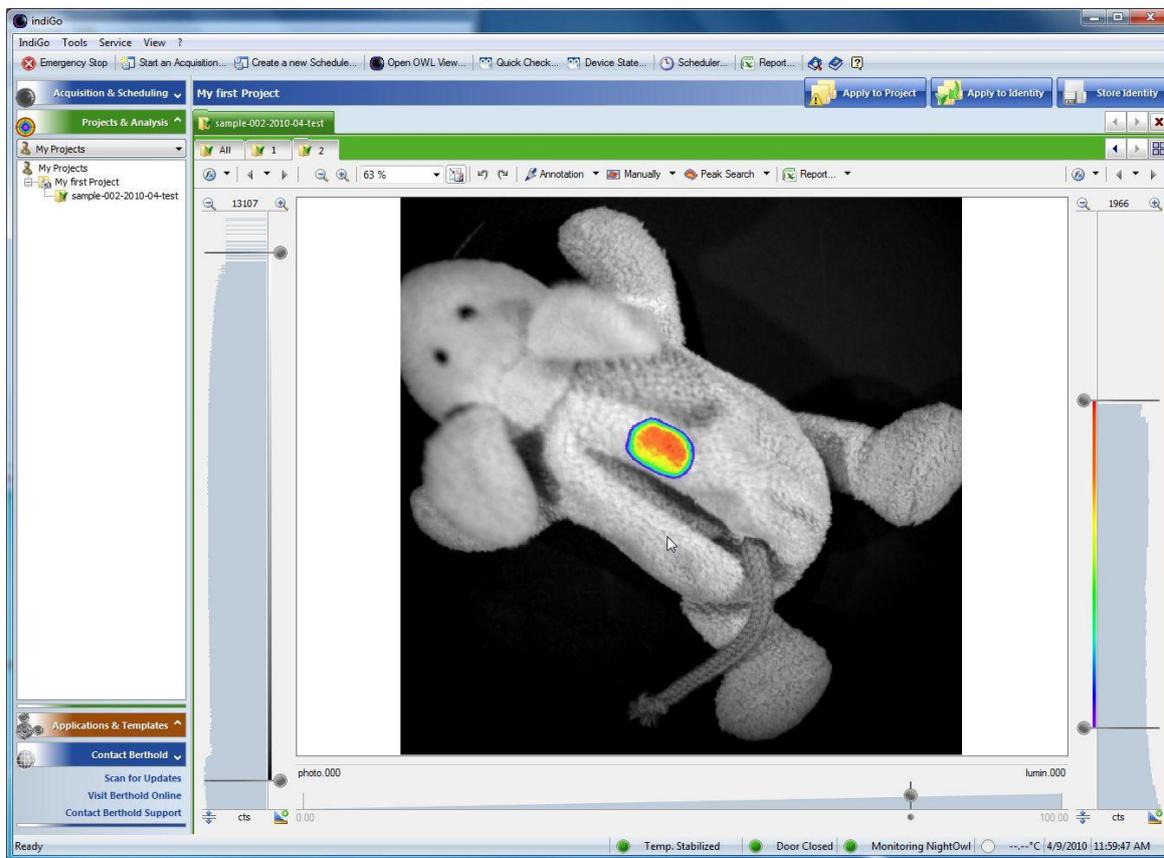
The project and identity might be pre-selected. Otherwise select the project and the identity from the provided drop down lists.

By selecting **Quick Check** a photographic preview of the sample using the project's settings can be created.

The preview might look as follows.



To start the actual measurement sequence select **Finish**. Upon completion of the measurement, the data is automatically stored and displayed on the screen.



The measurement consists of a photographic image in grayscale and the luminescence image combined in pseudo color.

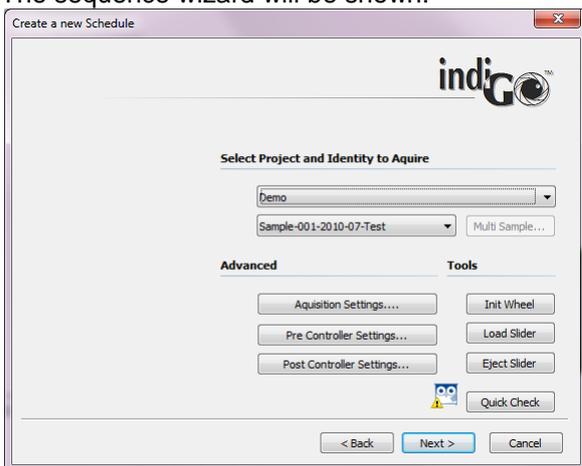
4.2.7 Image Sequences

In addition to single measurements indigo also offers automatic sequence measurements. These kind of measurements allows automatically triggered measurements in a predefined schedule.

To create a sequence measurement proceed as follows.

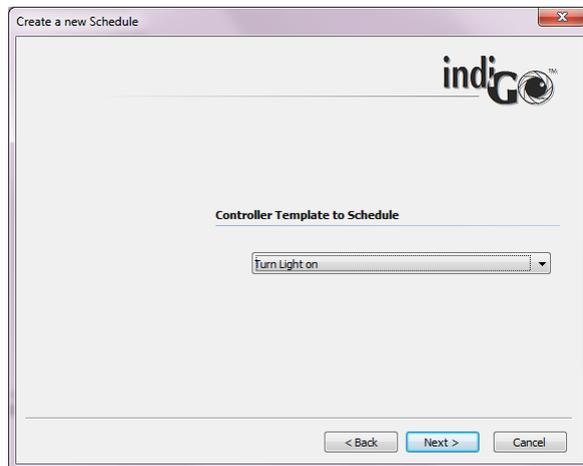
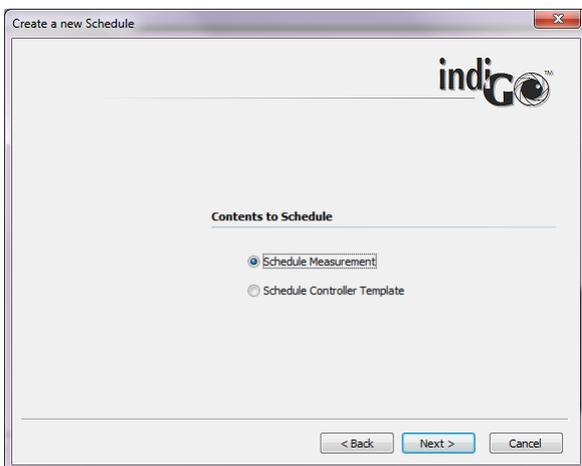
To start a sequence refer to **<Acquisition & Scheduling>**, **<Create a new Schedule>**.

The sequence wizard will be shown:

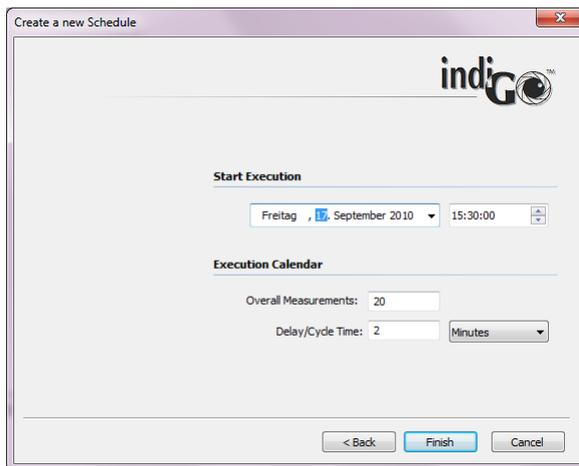


First of all the type of scheduled event must be specified. For Scheduled measurements choose “Schedule Measurement”, for control actions (lights on, mains switch, etc.) choose “Schedule Controller Template”.

Choosing the measurement mode a Project and sample ID must be selected. In case of the controller Template mode, the corresponding controller template must be selected from the list.



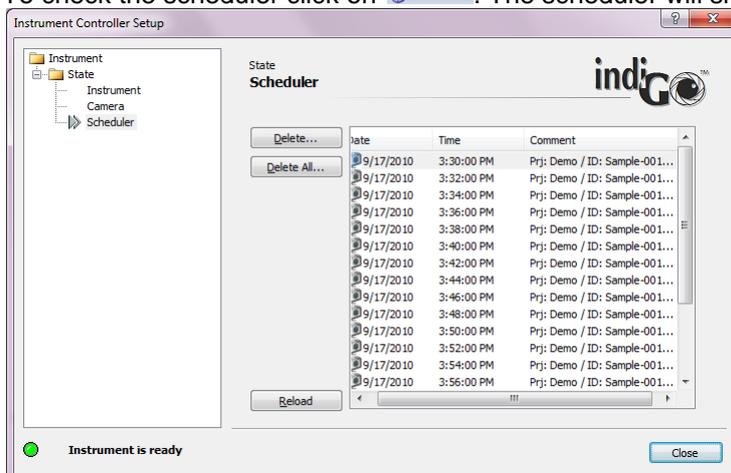
Clicking on **Next >** leads to the following dialog box.



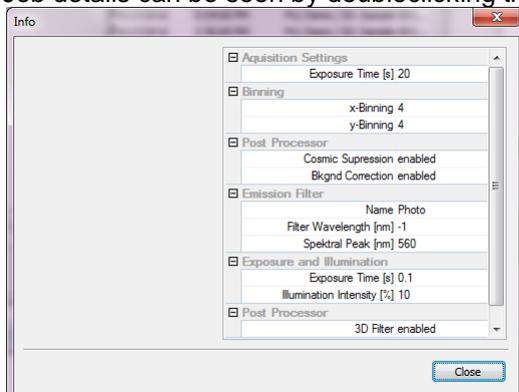
In this dialog box the Starting time for the first measurement or control sequence can be adjusted. In the section “Execution calendar” the total number of measurements / sequences as well as the interval time can be selected. Clicking on **Finish** will close the sequence wizard and the sequence is handed over to the scheduler.

Now the sequence is active and the instrument controller is taking care of the measurements. It's possible to evaluate other measurements or even exit indigo. Only the instrument controller must be running. This is the case as long as the indigo icon is visible in the taskbar.

To check the scheduler click on **Scheduler...**. The scheduler will show up displaying all queued jobs.



Job details can be seen by doubleclicking the corresponding item in the list.



To delete a single job, click on the item to select it and click on **Delete...**. To delete the whole Schedule click on **Delete All...**.

4.3 Image Processing and Evaluation Functions

4.3.1 Load Images

During the first acquisition images have been created and stored in the project folder.

To re-open the previously taken images refer to the project folder first and select the appropriate identity. All identities associated to the project are located in the project folder. The measurements including the images are stored under the context of the identity and can be opened by either doubleclicking on the identity or using the identity context menu.

Please note: The contents of the project folder shown depend on the user account, based on the indiGO user access management.

The identity number is displayed on top of the data view. If several sample IDs are open, a cardfile tab for each identity is displayed, each cardfile tab has its own color.



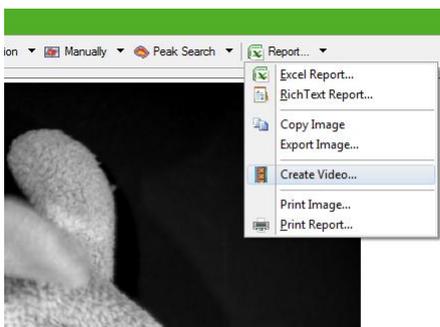
Below the identity number a row of index cards is shown containing the measurements acquired. The last acquired measurement is shown on the very right.

Using the   arrows you can scroll back and forth within the measurements or the identities.

To display a complete overview of the images, the so-called 'thumbnail view' select .

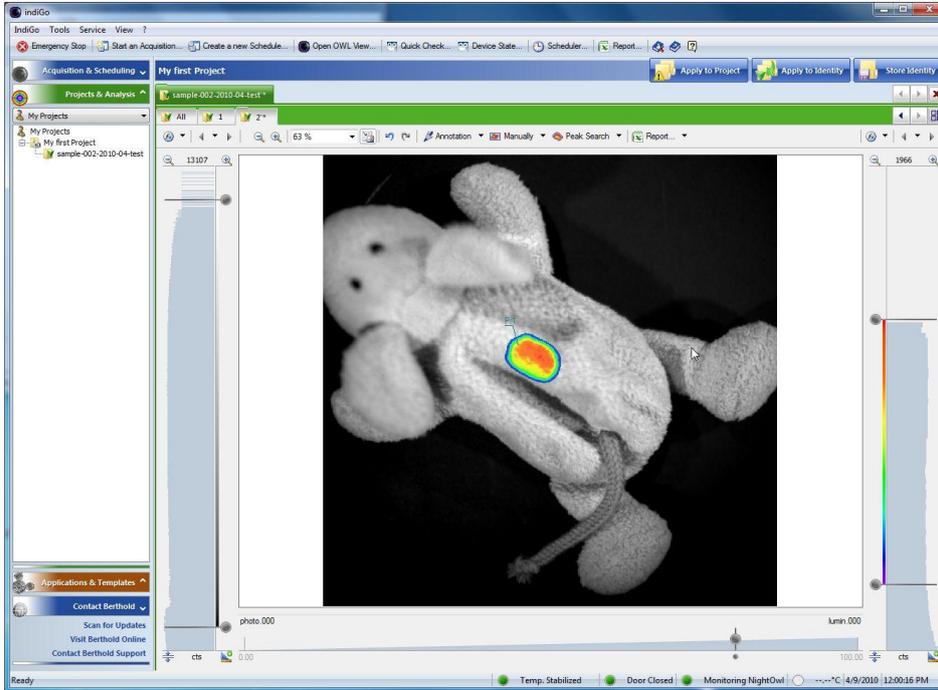
To close the identity select .

Using the **<create movie>** command in the **<Report>** menu a movie of all images in the current identity can be created.



4.3.2 The Graphical User Interface

After an acquisition or the opening of an identity the measurement and the photographic image are displayed. By default the photographic image is overlaid by the measurement or signal image using pseudocolors.

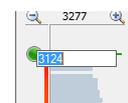


At the left margin of the screen you see the intensity scale and histogram of the photographic image, together with the associated sliders. These sliders can be used to change the brightness intensity of the photographic image. The top slider defines the upper brightness value, whereas the bottom slider defines the lower brightness limit.

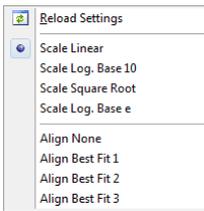
At the right margin of the screen you see the intensity scale and histogram of the measurement, together with the associated sliders. With these sliders the scaling of the pseudocolor signal image can be set. The top slider defines which intensity value has been assigned to the highest color value. Values above this threshold are not displayed (transparent area). The bottom slider defines which intensity in the signal image is displayed using the lowest color value. All values below this threshold are not displayed.

To modify the scale move the slider to the position required. Moving the mouse to the center of both sliders a center mark is displayed which enables you to move both sliders at once.

To enter a certain value rightclick on the slider and enter the new value in the input field.



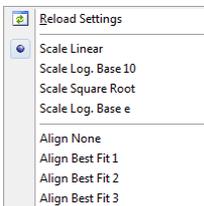
The system offers the possibility to zoom the histogram by using . The maximum range of the histogram is displayed on the zoom toolbar. By selecting <xxx> the histogram can be set to fullscale. With <xxx> the displayed unit can be changed from cts to %, nW or ph/s.



The scaling method can be changed via the context menu which can be invoked by clicking on the arrow next to the  icon.

The following options for the scaling are available:

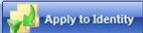
- Linear scaling
- Logarithmic scaling (base 10)
- Square root scaling
- Logarithmic scaling (base e)

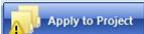


In addition different autoalignment preset features (Best fit 1 to Best fit 3) are listed to adjust the min / max value based on the histogram.

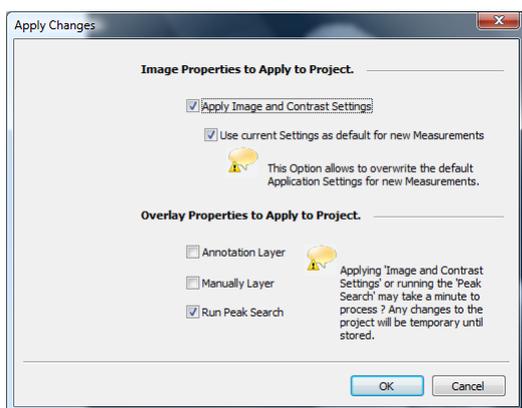
At the bottom margin of the screen a transparency slider is available. This slider can be used to define the transparency of the overlay. If the slider is in the 100% position, the overlay is completely opaque, whereas the overlay is fully invisible if the slider is set to the 0%.



Changes of the intensity scaling or the color threshold can be applied easily to all other measurements within the current identity using the  command. This simplifies the post run changes on measurements, as it is not necessary to modify every single image.

If the current changes should be applied to all identities measured within the same project, the  command can be used.

The command has to be confirmed and can be parameterized using the dialog shown below.



The following options are available:

<**Apply Image and Contrast settings**> will apply the image and contrast settings from the current image to all other measurements in the project.

If <**Use current Settings as default for new Measurements**> is selected, these settings are also valid for all future measurements in the project.

The selections <Annotation Layer> and <Manually Layer> will copy the areas and annotations to all other measurements within the project.

The <**Run Peak Search**> option will perform a peaksearch on all other measurements in the active project using the current settings.

The process will be started by selecting .

Please note:

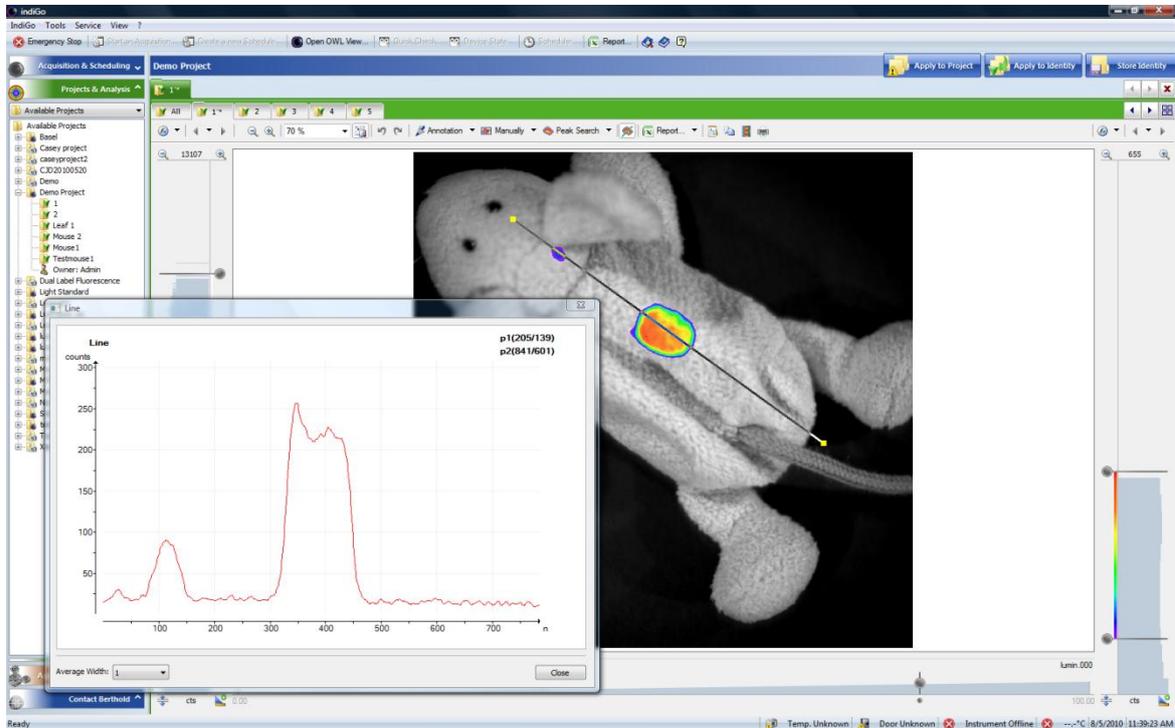
Depending on the selections and the amount of data this function may take some time to accomplish.

4.3.3 Line Plot

For further analysis of the measurements it might be helpful to create a 1D-line plot of the measured data. This function is recommended to evaluate the measuring data.

To use this function select .

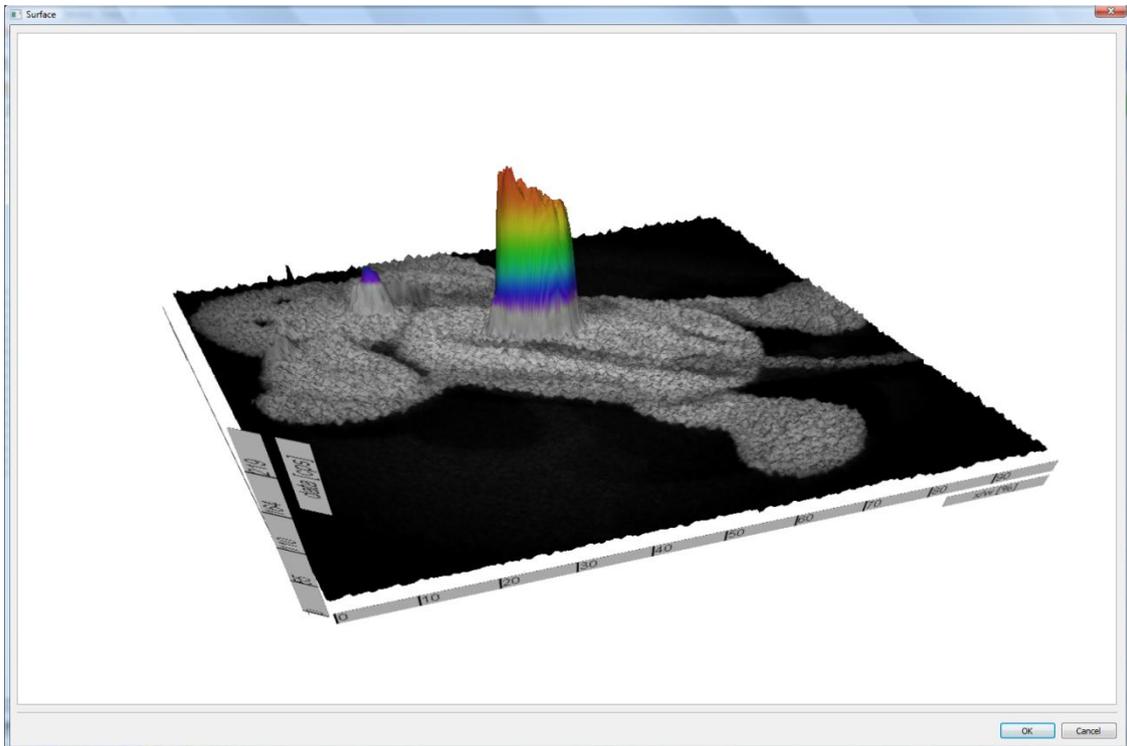
An additional window is opened where the line profile created from a given lead is displayed.



The pixel intensity along the selected path is displayed as a line diagram. The average width of the lead can be selected. Moving the lead updates the line profile.

4.3.4 Surface Plot

To get a 3D surface plot select **<Surface>** from the **<Report>** menu. The surface can be used for 3D visualization of the measured data.



To create a 3D surface plot from the photographic image only please refer to associated  command. The same applies if you want to create a 3D surface plot from the measurement data only.

From the dialog **<Photo Properties>** or **<Data Properties >** select **<Range>** and start **<Surface>**.

To change the perspective of the 3D-view pick the graph and move the image to the position required.

To animate the surface double click on the graph.

Please note:

The windows displaying the surface can be resized.

<ScreenShot>

4.3.5 Peaksearch

Once the image has been loaded and the color view has been set up, you can start to analyse the evaluation.

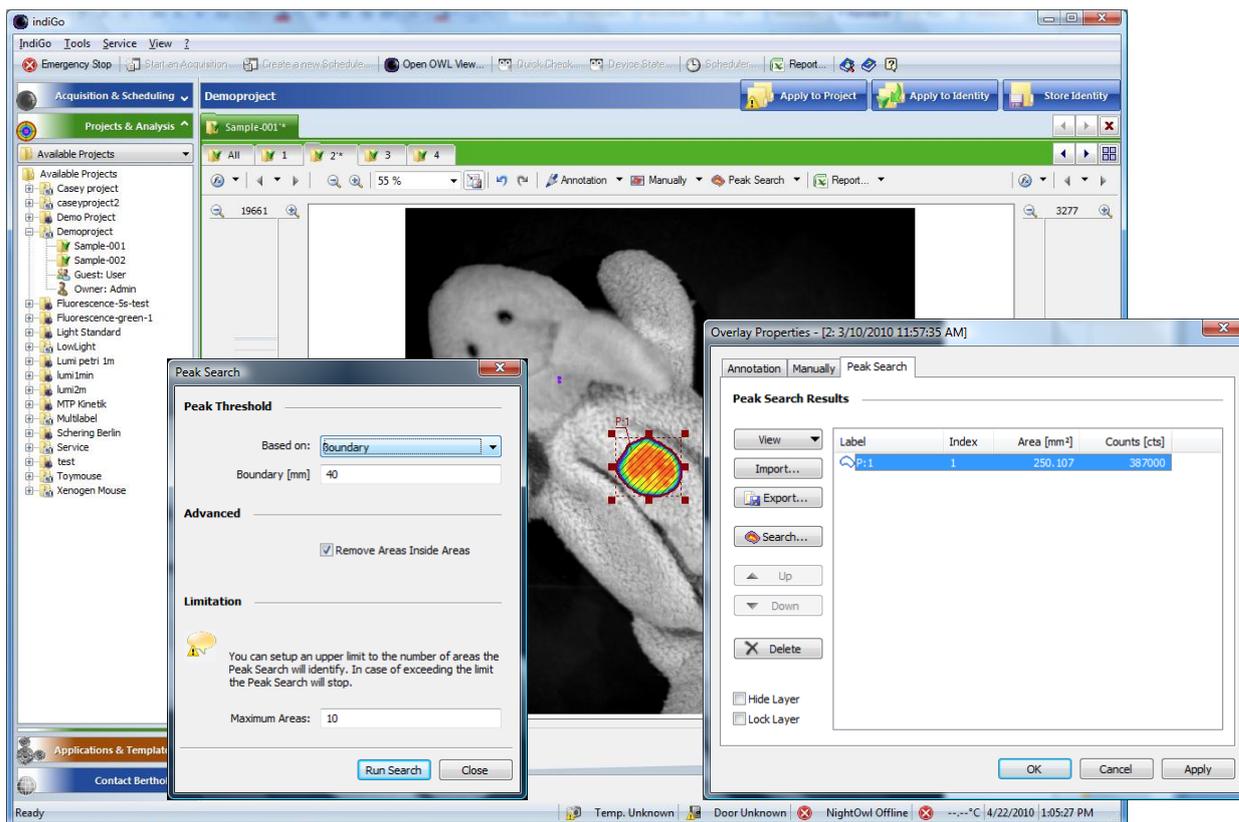
In the first step the desired areas has to be marked; now indiGO can calculate the intensity values.

The easiest method to find evaluation relevant data is to use the peaksearch.

Using the peaksearch all areas lying above a threshold value will be marked. With this method it is possible to evaluate different measurements under exactly identical evaluation conditions.

To start the peak search select .

The displayed overlay properties window gives an overview of all automatically found peaks in the current image.



To run a new search select .

The following parameters can be edited:

- **Peak Threshold - Based on**

Using a droplist different search algorithms are available:

- **Area**
The area of every possible spot is analyzed and if the area is larger than a size specified in a parameter box below, the spot is validated as a peak. This is useful to get rid of smaller, unwanted spots.
- **Boundary**
The most common algorithm is the boundary discrimination. The boundary of every possible spot is calculated and if the boundary is larger than a specified size from a parameter box below, the spot is validated as peak. This is useful to get rid of smaller, unwanted spots.
- **Noise detection**
A special noise analysis filter is used to analyse the image and identify the peaks. For this method no parameters are required.

- **None**
No discrimination method is being used. Every spot which is above the given lower threshold will be treated as peak.
- **Advanced - Remove Areas Inside Areas**
If this option is set areas which are located inside other areas will be declined.
- **Maximum Areas**
This parameter defines the maximum amount of peaks. If this amount of peaks is found the peak search stops despite of being completed. This will protect from long waiting times in case a very noisy image is used with hundreds of possible peaks.

To start the peaksearch select .

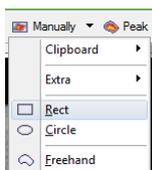
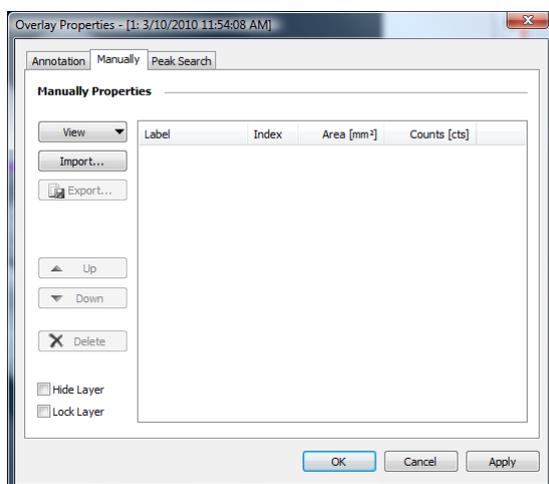
4.3.6 Define Areas Manually

The “**Manual Areas**” are available via the command **<Manually>**.

They are used for the manual definition of integration areas. Here you have the possibility to define free forms, such as circles, rectangles or polygons.

To start this function select .

A window is opened where an overview of all currently defined areas is displayed. If you have not defined any areas the list will be empty.

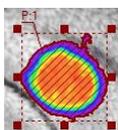


If you want to create new areas open the context menu by using the arrow on the button **<Manually>** and select the required shape (rectangle, circle or freehand shape) from the context menu.

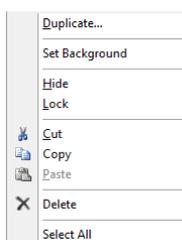
With the mouse cursor shown on the image the selected shape can be drawn by dragging into the required area of the image.

To define a freehand shape circle the desired area with several clicks on the left mouse button or hold it down completely (pencil mode). A double-click will end the procedure. The painted shape will be connected automatically and the freehand shape will be closed by a frame.

If you click on an area that has already been created, you will see “handles” around the edge of the area. The area can be resized by dragging the “handles” to the desired size.



The shape can be moved to another position. To do this you have to move the mouse to the boundary of the shape. The mouse pointer will be changed automatically to a hand cursor. If the hand cursor is displayed press the left mouse button and drag the shape to the required position.



A context menu for all shapes is available. To open the context menu select the shape and right-click inside the shape.

For editing the standard clipboard commands are available

To use the object for background subtraction select **<Set as background>**.

An object defined as background area is identified by a checkmark in front of the context menu entry. In this case the average intensity of the area is defined as background and subtracted from the intensities of the other areas in the report.

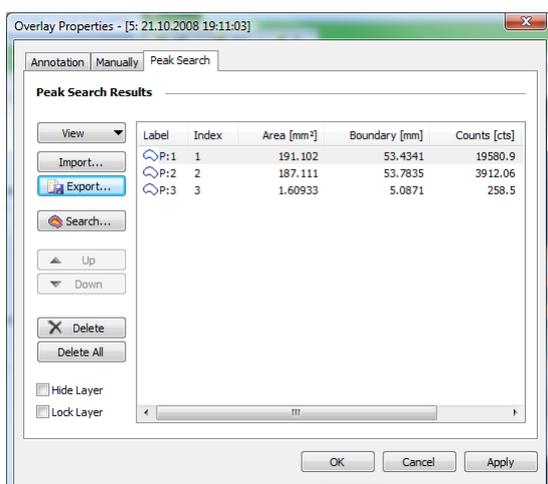
To create a copy of the current area select **<Duplicate>**.

To lock the whole layer, use the command **<Lock>**.

A locked area cannot be moved any longer unless it's being unlocked through the **“Overlay Properties” <Lock Layer>**.

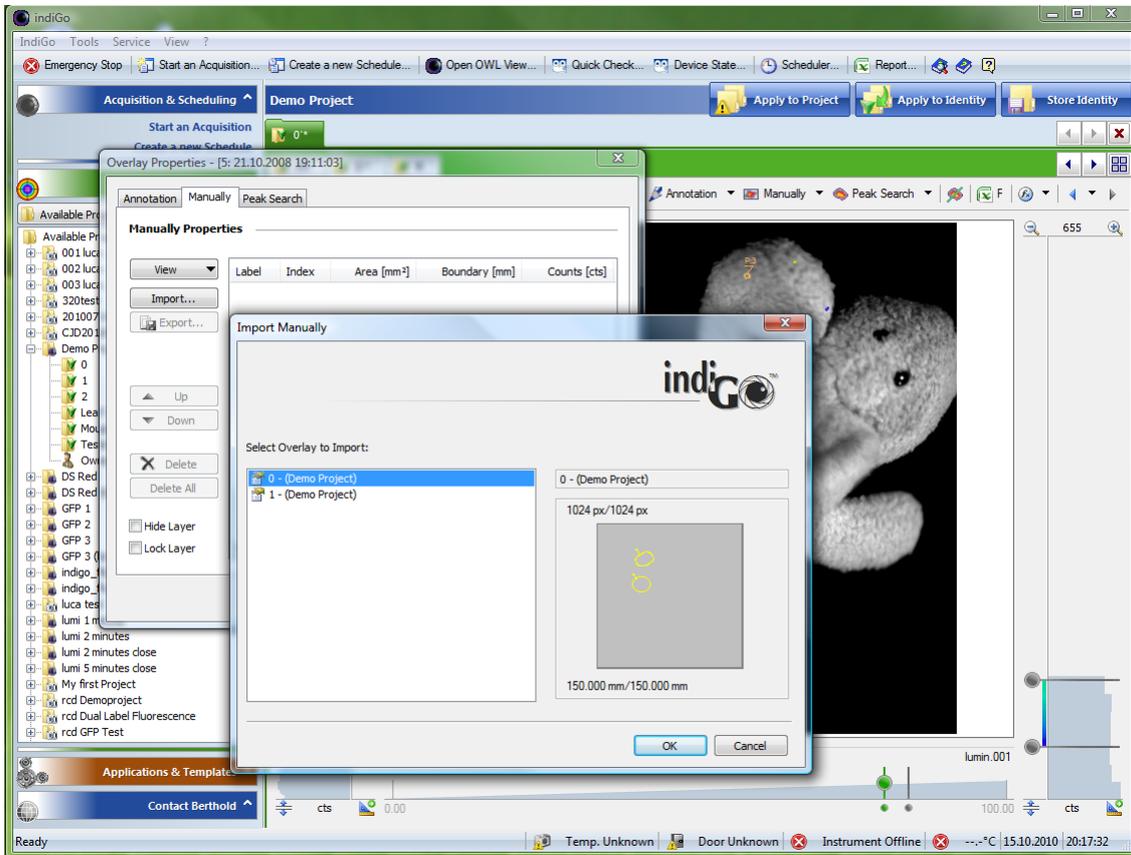
The layer becomes invisible by selecting the command **<Hide>**.

To delete all areas refer to **“Overlay Properties” <Delete All>**.



Further commands for the area management are available via the context menu of the area items list.

To export areas the <Export> command from the “Overlay Properties” can be used.
To import areas the <Import> command from the “Overlay Properties” can be used.

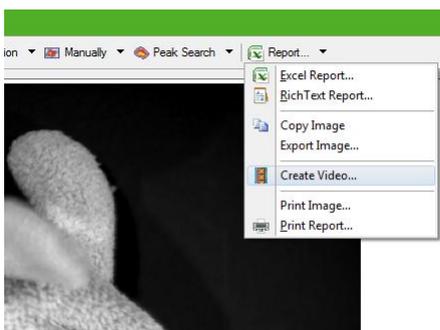


4.4 Creating a Report

4.4.1 Creating a Rich-Text-Report

indiGO offers the possibility to create and display measurement reports. The output can be adapted to the user's requirements.

Using the **<Rich-Text-Report>** command in the **<Report>** menu will start the Rich-Text-Report-Creation-Wizard.



To create a report follow the instructions given by the wizard. In brief the following options can be set.

- **Create a Front Page**

This will create a report front page. The contents of the page, like your company name, address or logo can be setup through the indiGO options.



- **Export Images**

If this option is set, all overlay images will be included into the report. You can also select, whether the overlay areas will be included into the images.

- **Units Area & Elongating**

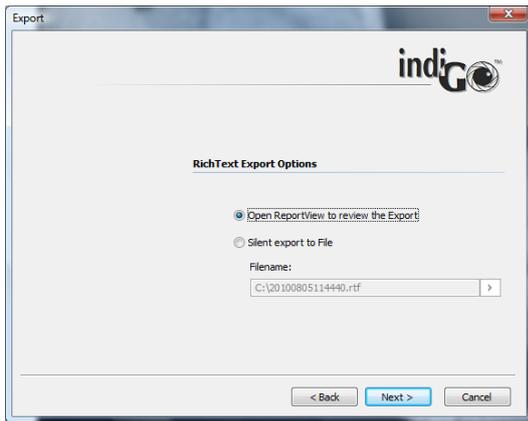
Different units for the areas and the elongatings can be selected.

- **Measured Data**

Different units for the measured data can be selected.

- **Rich Text Export Options**

The report can be opened to be printed or stored into a file for further usage.

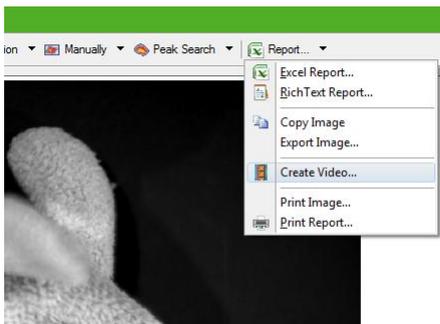


4.4.2 Excel Export

indiGO provides a very comfortable report function, the possibility to create Excel exports. In an Excel export, a complete measurement report, including all images, analysis data and in addition, diagrams containing a graphical view of the measurement results can be created.

To use this function Excel 2007 is recommended. Other spreadsheet programs are not supported.

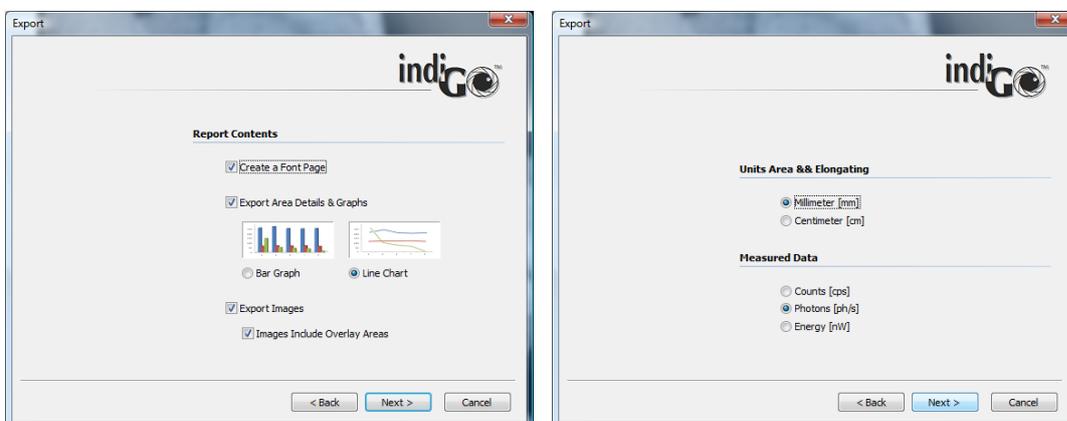
Using the **<Excel Report>** command in the **<Report>** menu will start the Excel-Report-Creation-Wizard.



To create a report follow the instructions given by the wizard. In brief the following options can be set.

- **Create a Front Page**

This will create a report front page. The contents of the page, like your company name, address or logo can be setup through the indiGO options.



- **Export Area Details & Graphs**

You can select either bar graphs or line charts to be created.

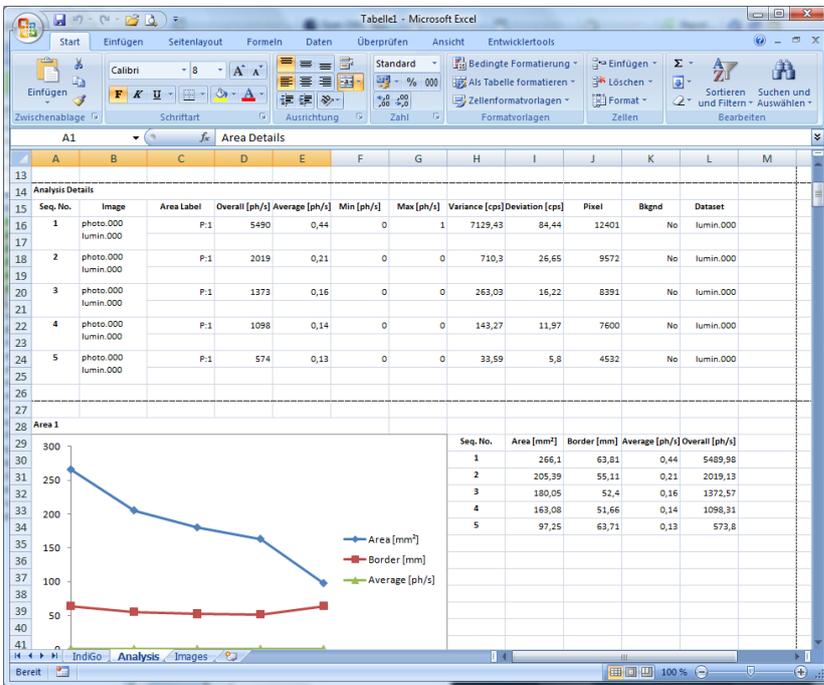
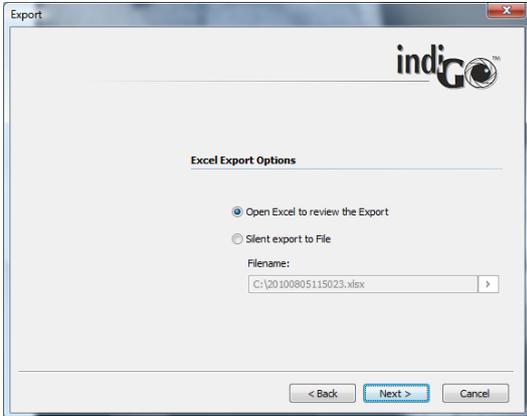
- **Export Images**

If this option is set, all overlay images will be included into the report. You can also select, whether the overlay areas will be included into the images.

- **Units Area & Elongating**

Different units for the areas and the elongatings can be selected.

- **Measured Data**
Different units for the measured data can be selected.
- **Excel Export Options**
The report can be opened to be printed or stored into a file for further usage.



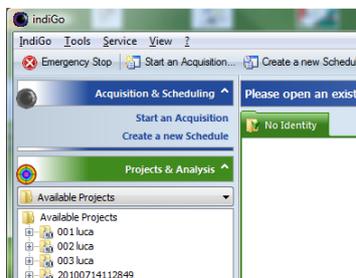
The spreadsheet will contain one to three worksheets depending on the selected options:

- **IndiGO**
The “IndiGO” sheet contains the front page
- **Analysis**
The “Analysis” sheet contains all measurement results and the diagrams, depending on the settings.
- **Images**
The “Images” sheet includes the overlay images and all additional measurement information e.g. file name, date of acquisition, sample description and measurement parameters, to ensure reproducibility of the measurements.

4.4.3 Using the Scheduler

Control sequences like sunset and sunrise or measurements for selected identities can be controlled via a scheduler. You can think of the scheduler as a simple list of time controlled events.

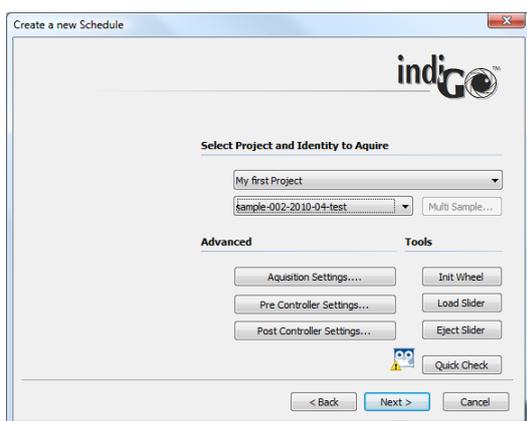
To start an acquisition, refer to **<Acquisition & Scheduling>** **<Create a new Schedule>**.



The system will start the **<Create a new Schedule>** wizard, which allows you to select the contents you want to schedule first.



To schedule a measurement select **<Schedule Measurement>** and chose **Next >** to continue.

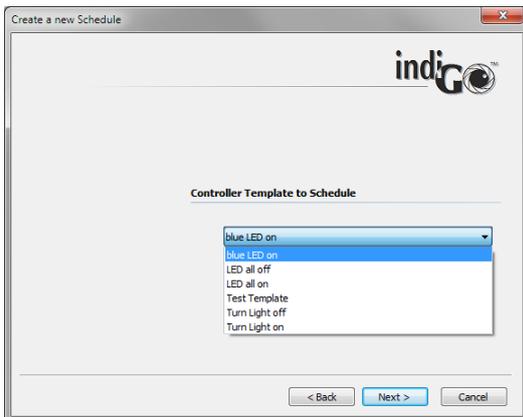


On the next page you can select the project and the identity you want to measure.

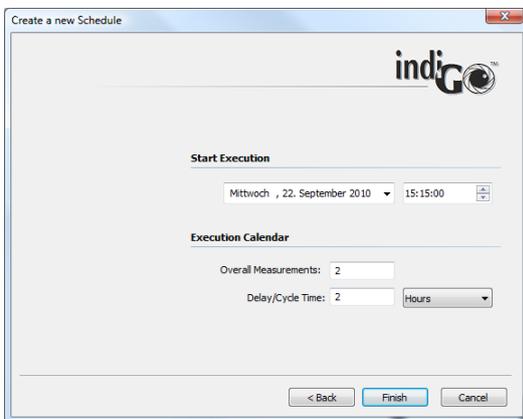
Using the **<Advanced>** or **<Tools>** commands you can validate the acquisition, pre- and postcontroller settings or initiate a **<Quick Check>** to create a test image.

Chose **Next >** to confirm the selected options and continue.

When selecting **<Schedule Controller Template>** a dialog box pops up to select the desired control sequence.



Chose **Next >** to confirm the selected template and continue.

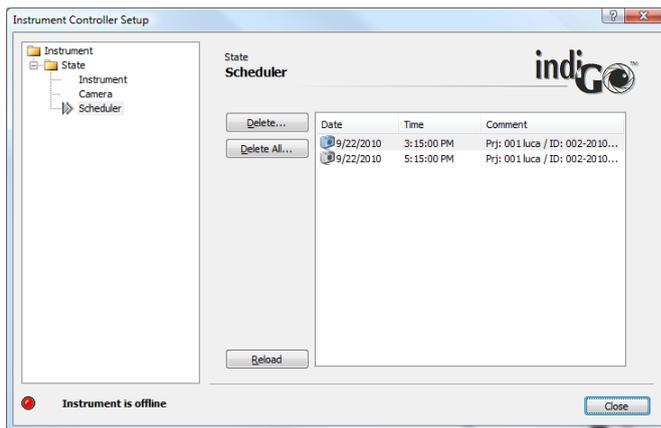


On the next page the **<Start Execution>** time can be selected. In the sample above, the first measurement will be executed on Wednesday the 22th of September at 15:15:00.

The **<Overall Measurements>** are set to 2 and the **<Delay/Cycle Time>** was set to 2, as well. Therefore the system will add two measurements into the scheduler. The first will be executed Wednesday the 22th of September at 15:15:00 and the second will be executed Wednesday the 22th of September at 17:15:00.

The measurements will be executed in the background by the scheduler and will be sorted automatically into the indiGO structured tree.

The contents of the scheduler can be verified or deleted via the **<View> <Scheduler>** command from the main menu of indiGO.

**Note:**

If you open the selected project and the scheduled identity, the measured image data will be displayed automatically, too.

5 System Description

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5.1 Use and Function

NightOWL II LB 983 is a powerful Imaging System for luminescence and fluorescence measurements. It is used to acquire and evaluate images in the macro and micro area in a large intensity range.

The system is so flexible that the camera can be used outside the acquisition chamber for microscope applications or for fluorescence measurements by using UV lamps or the optional white light source with goose neck light guide.

Please observe the relevant safety precautions (face protection mask or eye protection) if you are working with UV lamps or transilluminators..



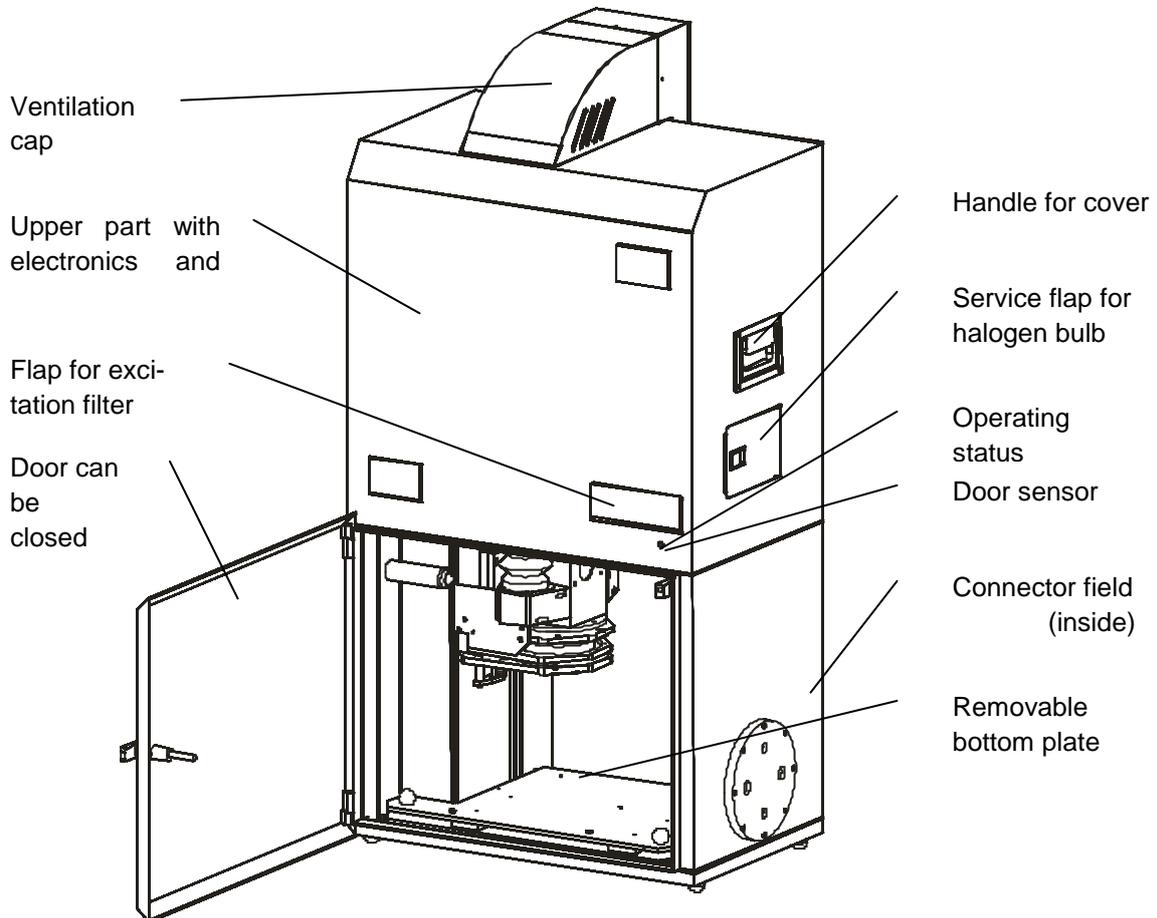
NightOWL II LB 983 comprises the following components:

- **Acquisition device** including the transport mechanism with camera and lens and the electronics. The high-resolution CCD camera and the special wide open lens guarantee excellent sensitivity and image quality.
- The control of the acquisition system and the image processing and evaluation take place under control of the powerful **software system indiGO**. The easy-to-use and clearly structured Windows software covers the entire spectrum of image processing functions.
- The **PC system** including a standard computer (Pentium 4® or other processor) with high-resolution monitor. We recommend a resolution of at least 1024x768 pixels.
- **Image output** to any Windows printer (laser or ink-jet printer) or video printer.



5.2 Design of the Acquisition Device

The acquisition device includes the hardware and electronics required for image acquisition. It comprises the acquisition chamber (dark box) including the camera lift with camera, lens and filter wheel. The electronics and excitation light source for fluorescence measurements are accommodated in the upper part of the device. The ventilation cap is designed for drawing off the waste heat caused by the camera cooling.



Do not move the camera lift as long as the door is open! Risk of injury!

Front side

- Light-tight door with handle to close the acquisition chamber
- Door for loading and unloading the filter slider for fluorescence excitation
- Operating status indicator
-
- Inside the **acquisition chamber**
- Inductive sensor detecting the door position
- Bottom plate (removable) to position the acquisition objects
- 4 LED's illuminating the acquisition chamber
- Camera lift with transport unit, camera, lens and filter wheel
- Connector field
- Outlet of the fluorescence light for connection of the illumination light guide

Rear panel/Top part

- Connection ports
- On/off switch
- Mains fuse
- Mains connector
- PC port (Ethernet or USB)
- System upgrade
- Cable port (light-tight, 5-pole cable conduit for special applications)
- Data cable (only for version with NC100em)
- Push buttons for opening the cover for the upper part of the NightOWL
- Ventilation slits

At the side

- Carrying handles
- Service flap for halogen bulb

Bottom

The NightOwl stands on four feet; the height of these feet can be adjusted to compensate for uneven setup locations.

5.3 Acquisition Chamber

5.3.1 Light-tight Door with Door Button

To close the acquisition chamber light-tight, the door frame is provided with an elastic sealing and a handle which, when turned by 180°, will pull the door into the frame and squeeze it against the sealing. An inductive sensor indicates if the door is closed correctly.

Always make sure that the door is properly closed. If the door is not closed and you try to take an image, you will be alerted by the program.

Images can be taken even while the door is open. The camera is insensitive to daylight, i.e. the camera will not be destroyed by overexposure.

5.3.2 Illumination of the Acquisition Chamber (Dark Box)

Four LED's installed on the walls of the dark box ensure constant illumination of the acquisition chamber. However, the illumination is dependent on the camera setting and with very low camera position it can be affected adversely. If necessary, an additional light source has to be installed (power is supplied via the outlet strip in the acquisition chamber).

The illumination of the acquisition chamber is automatically controlled by the software.

5.3.3 Connector Field

The connector field is located in the right rear corner of the acquisition chamber; it includes the following ports:

<i>Round socket:</i>	Light-tight, insulated cable conduit to the rear panel
<i>Center sockets:</i>	System connectors to control instrument options (e.g. heating table)
<i>Upper mains socket:</i>	Mains socket enabled when device is turned on
<i>Lower mains socket:</i>	Mains socket enabled via software



5.3.4 Camera and Lens

NightOWL II LB 983 can operate with different camera systems. The following camera is supplied as standard: NightOWL Cam NC 100U, hermetically vacuum encapsulated and cooled down by a Peltier element to -70°C (the operating temperature is reached after about 10 minutes). The ambient temperature should not exceed 28°C to ensure the proper operation of the camera cooling.

The camera is connected with the electronics via 2 cables (voltage supply and USB communication) on its top side.

Maximum sample size for standard resolution images:

230 mm x 340 mm, for the NC-320 camera; With the NC-100 camera the max. sample size is 250 mm x 250 mm.

The camera is compact, so that it can easily be installed on a microscope.

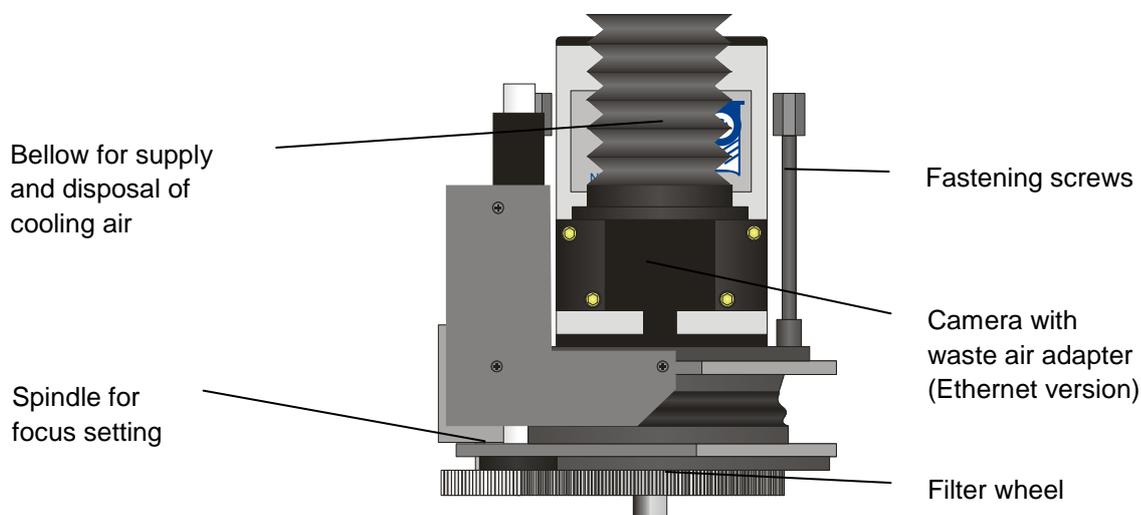
The standard **lens** is a 25 mm wide open lens. The software includes a calibrated data set for automatic setting of this lens.

Distance and diaphragm are set at infinity (= widest opening). This setting is calibrated and fixed with screws. You should keep this setting, since any modification will result in a deterioration of the light flow rate.

Discharge electrostatics before taking out the camera.

Clean the camera and lens only with special cleaning products from your photo shop (see page 112).

5.3.5 Camera Transport Unit



Camera and lens are installed on the camera transport unit on two levels that can be shifted relative to each other. The camera is fixed to the upper level by two knurled screws, the lens is installed into the C-mount adapter on the lower level from below.

To adjust the focus, both levels are shifted relative to each other. This movement is controlled by the software and effected via a spindle (at the back of the camera transport unit).

The movement of the camera transport unit is controlled by the software.

The automatic setting of camera and focus take place via the sample size and height parameter.

In emergencies you can move the spindle by hand, for example when the camera transport unit has accidentally hit the bottom plate. This only works, when the instrument is turned off.

The camera transport unit includes a device to prevent collisions with the bottom or ceiling of the camera box, i.e. a micro switch stops the lift movement (audible click), when the camera transport unit collides with the sample. When the resilient bottom part of the camera transport unit touches the bottom plate or the sample carrier, the micro switch stops any further movement. This may happen in extraordinary cases, for example, when the computer crashes while the transport unit is moving down. The camera transport unit can be moved up under control of the software only after the blockage is removed. See chapter 7.1 for more information.

5.3.6 Camera Lift

The camera lift moves the camera transport unit. The movement is also controlled via software: The automatic setting takes place by providing information on the sample size in the application definition. Reference level for the sample height is the surface of the extending table.

Take off the bottom plate to have access to the spindle which moves the camera lift.

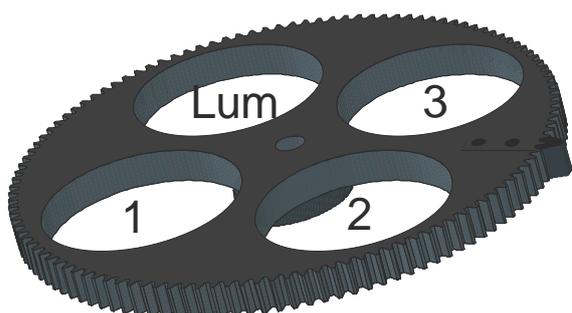


Do not reach into the instrument while the camera lift is moving → Risk of injury.

5.3.7 Filter Wheel

The filter wheel is installed below the camera.

It is held by a magnet and can be taken out from below with a slight jerk. The filter positions are identified by numbers (1 to 4).



Please observe the correct installation direction (arrow on the filter wheel) when loading the filter. Please refer to the filter manufacturer's description. The filters should be secured from above against falling out by the snap rings which are included with the device. For installation, slide the filter wheel onto the shaft until you feel distinctly that it has snapped into place. Then click from the Acquisition dialog box (Start an Acquisition)

to initialize the filter wheel.

In the filter manager you can enter name and properties of all filters. The filter inventory is separate for emission and excitation filters. The filter manager handles the filter wheels with their filters.

Filter position 4 should remain empty for the acquisition of photographic images.



Do not reach into the filter wheel while the wheel is moving → Risk of injury.

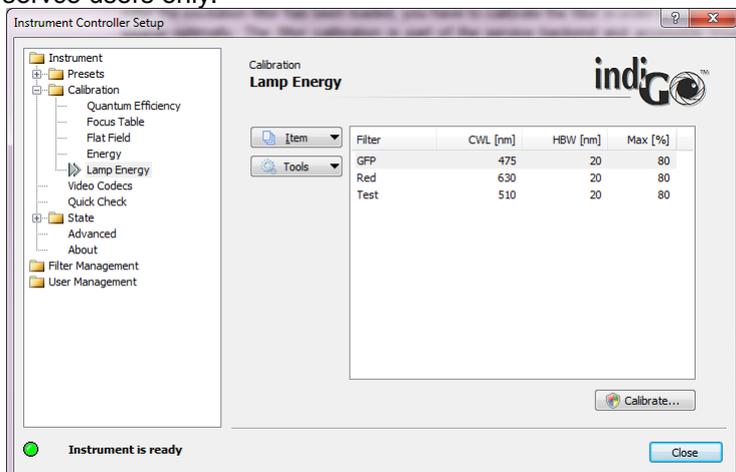
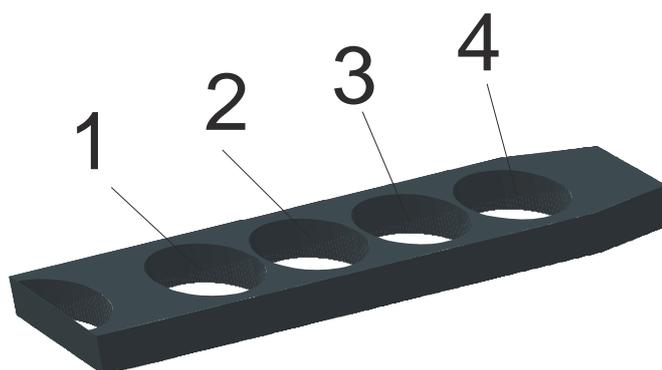
5.3.8 Filter Slider

The filter slider can accommodate 4 excitation filters with a diameter of 25 mm (or 1 inch).

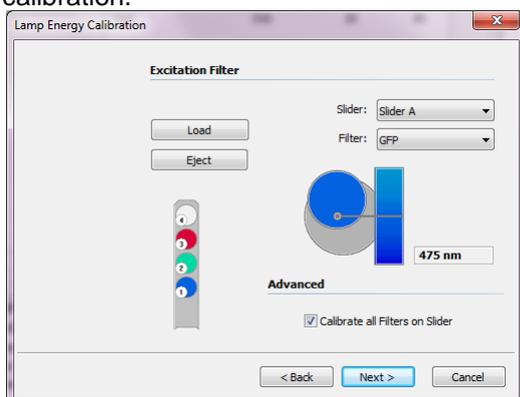
Use the IndiGO software function **[Start an acquisition]** menu to open the filter slider menu. Click the **Eject Slider** button to eject the filter slider. Please observe the correct installation direction (arrow on the filter wheel) when loading the filter.

To insert the filter slider again, push it into the holder until it snaps into place. Then click on **Load Slider** to move the filter drawer into the device and to initialize it.

After the excitation filter has been loaded, you have to calibrate the filter in order to use the light source optimally. The filter calibration is part of the service backend and accessible through service users only.

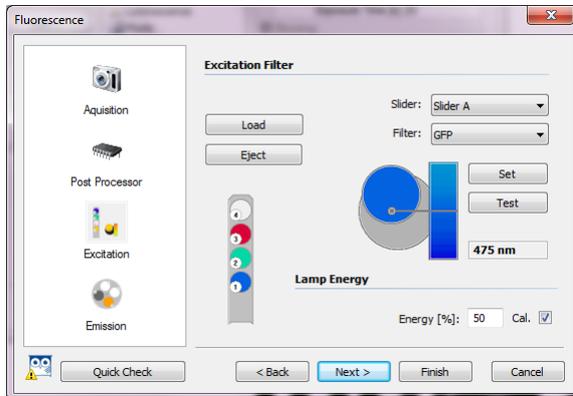


In the service backend, just click on “Lamp energy” in the calibration section to access the lamp intensity calibration. All excitation filters from the filter inventory are listed. Clicking on **Calibrate...** opens calibration dialog. The filter slider selection pops up to select the desired filter slider for calibration.



Click on **Next >** to calibrate the filters in the selected slider. This process takes about 30-50 seconds per filter. Only filters that are assigned to a slider, can be calibrated.

In the application definition you can select the excitation and emission filter and the lamp energy for fluorescence measurements. For best results we recommend a lamp energy between 80 and 100%. Available filters can be selected depending on which filter wheel / slider configuration you have selected in the <Excitation> and <Emission> section.



The Berthold Application Support is available to recommend filters when you are selecting the optimum filter combination for your fluorescence application.

5.3.9 Bottom Plate

The bottom plate helps you to position the acquisition objects. It includes two bolt heads on the front panel to help you position and fix the samples or sample masks accurately. In addition, there are 2 drilled holes for accurate positioning of sample holders.

Maximum sample size for acquisition:

Standard resolution: 250 mm x 250 mm (NC-320 230 mm x 340 mm)

The maximum dimensions are slightly different if you are using other aspect ratios and resolutions. The sample size is defined in the **<Sample Size>** section.

The bottom plate is the focus level for the automatic camera setting (sample height 0 mm). If the acquisition area of the sample is higher (e.g. due to a sample holder), you have to take this difference into account.

The sample holders for animal anesthesia, which are available as extras, and the line light, for example, increase the sample height by 40 mm. If the sample is placed on such a table, you have to enter 40 mm as minimum height.

If you are measuring animals, you should enter half the animal's height as sample height.

Calculation example:

Animal height 30 mm, sample holder for gas anesthesia is used (40 mm high).

Total height of sample = ½ animal height + table height = 15 mm + 40 mm = 55 mm

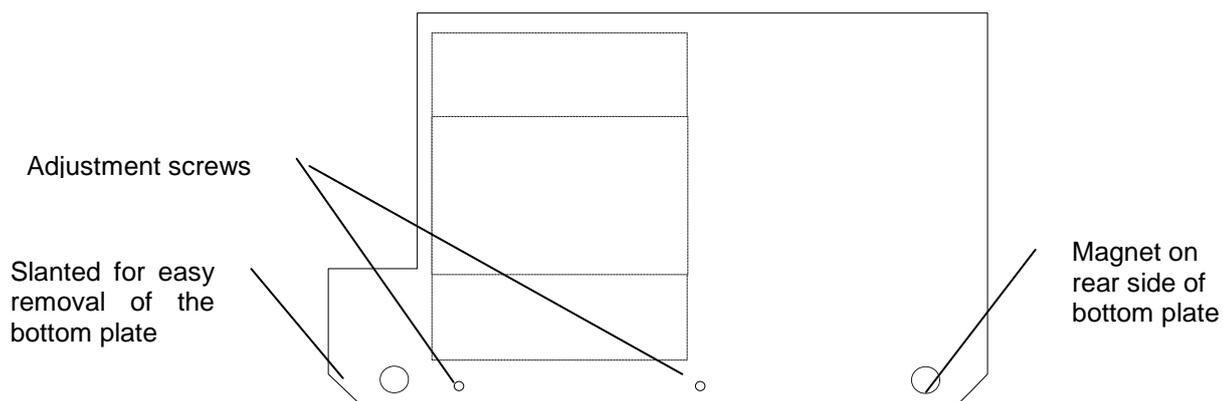
Enter 55 mm as sample height in the **[Sample Size]** dialog box, **[Sample Height]**.

The bottom plate can be removed:

- for cleaning, if liquid was spilled, or
- to turn the screw nut to move the camera lift manually (see chapter 7.1).

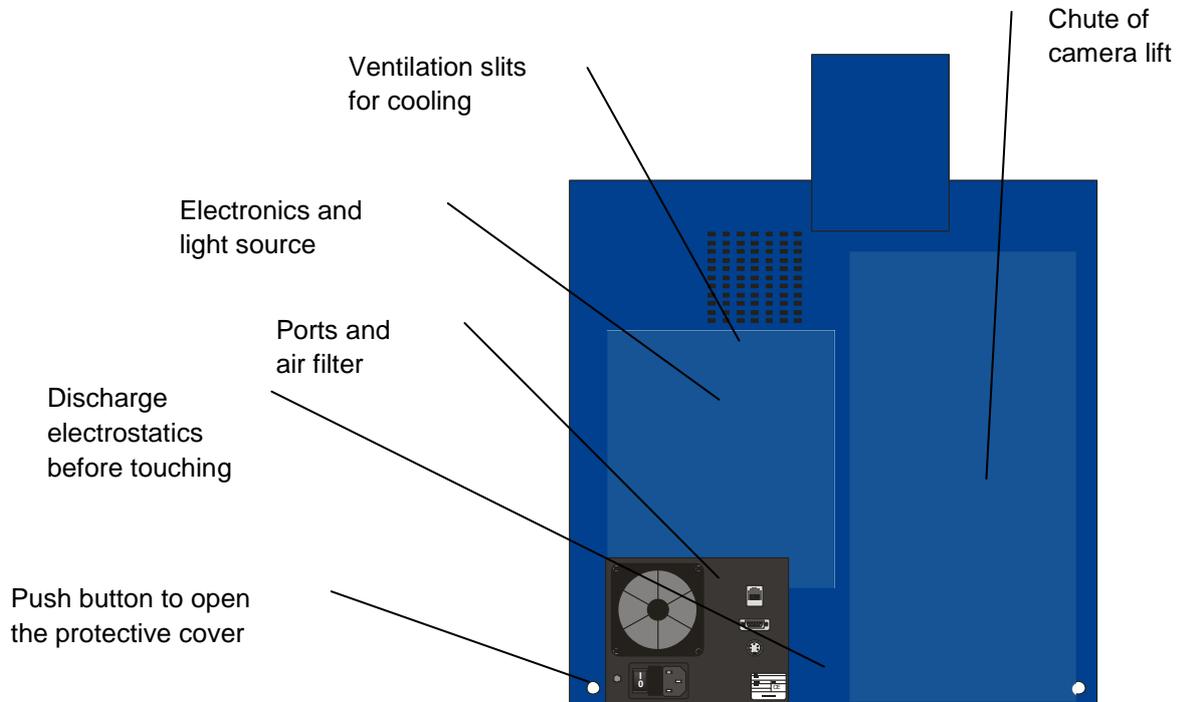
In addition, the bottom plate can be pulled out from the front to facilitate the loading of samples. When you push the bottom plate back in again, make sure that the plate snaps into place with an audible click.

The bottom plate is held by two magnets on its bottom side.



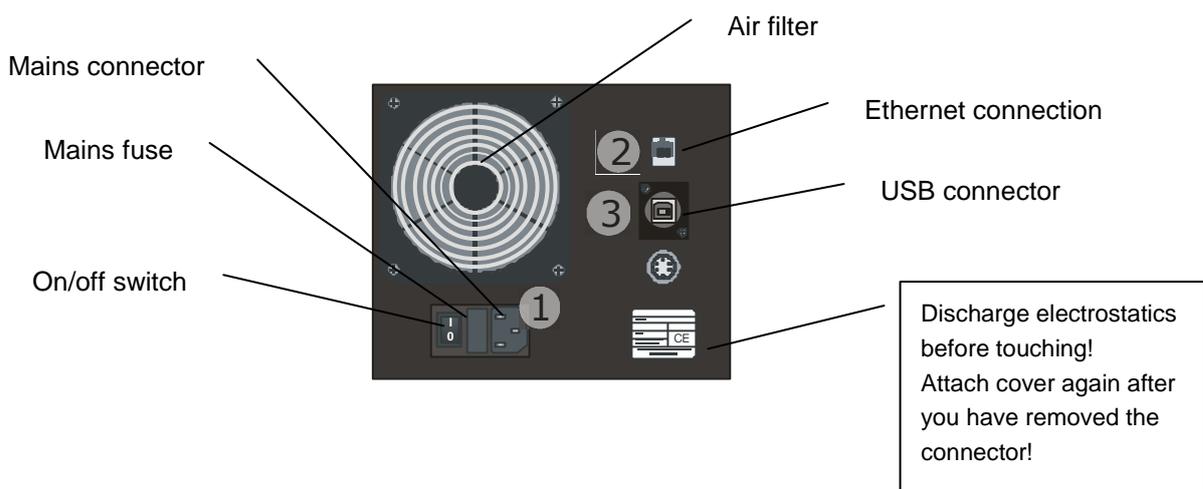
5.3.10 Top Part of Acquisition Device

The upper part of the instrument contains the chute of the camera lift, the fluorescence light source (option) and the complete electronics.



The ventilation slits of the cooler must always be open!

5.3.11 Connections on the Rear Panel



see chapter 8.2.1 for information on how to replace the fuse and how to clean the air filter.

5.3.12 Taking Off the Protective Cover

Before taking off the protective cover, you have to

- **Pull the power cord before you open the device!**

In the bottom area of the rear side of the protective cover there are 2 holes behind which there are white push-buttons.

Push these two buttons to mechanically unlock and take off the protective cover. Hold the cover on both handles at the side and lift it off from above.

5.3.13 Microscope Acquisitions

Microscope acquisitions are possible in two different configurations. Some microscopes are small enough to be placed inside the dark box. This mode is only possible using the USB camera. The second possibility is using an external microscope in a dark chamber. This configuration requires a special solution and is not described in this manual.

To perform microscope acquisition inside the NightOWL proceed as follows.

Positioning the camera at working height

Move the camera transport unit to a height that allows you to easily remove the camera (several centimeters above the bottom plate).

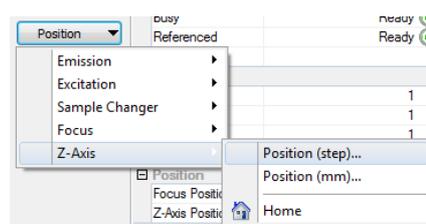
Discharge electrostatics before carrying out any work.

- Open the door of the acquisition chamber to check the movement of the camera transport unit. Check that there is no sample tray or any other device which may block the camera movement.



Do not reach into the acquisition chamber while the transport unit is moving!

- Move the camera (z-axis) into the low position (step 98000) using the service software or indiGO. Click on **Device State...**, select Position and choose Z-Axis and Position from the dropdown menu.
- Enter 98000 steps at the prompt and press OK to move the camera to the specified position..
- The camera moves down to the working height. Switch off the system after the position is reached.
 - Unplug the power and USB connector from the camera.



Discharge electrostatics before touching the connector!

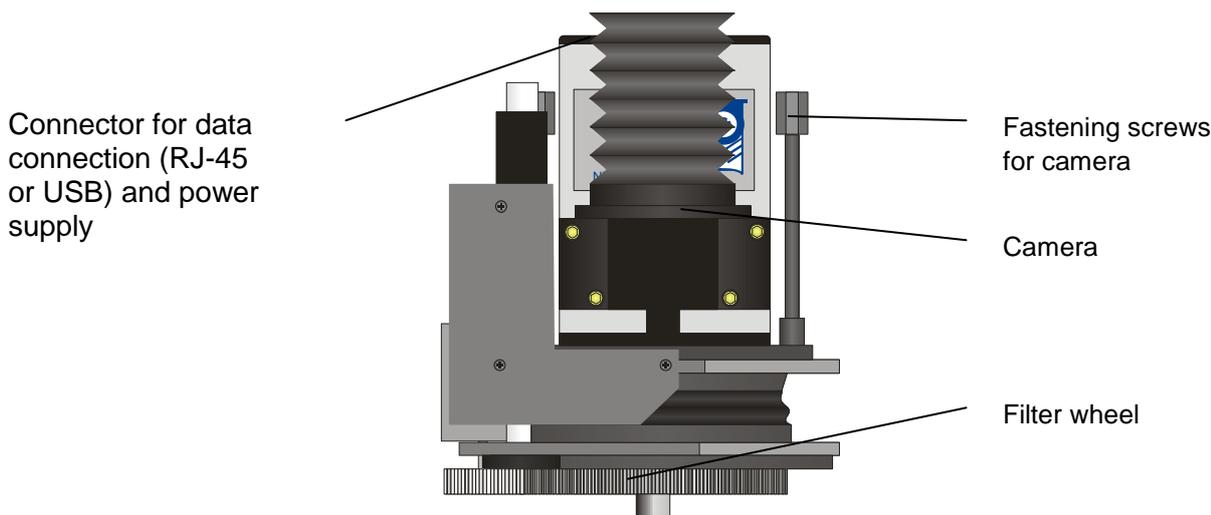
- Remove the air adapters from the camera. Fix them at the camera plate (transport lock) so they cannot block the camera drive movement.
- Unscrew the camera screws and remove the camera from the instrument.
- Replace the current camera power cable at the outlet with an extended version and also extend the USB cable using a specific USB extension cable. These cables are available at Berthold upon request.



- Switch on the NightOWL and wait until the camera has moved into the upper position. Switch off the NightOWL after the the position is reached.
- Replug the power and USB cable at the camera, place the microscope in the darkbox and mount the camera on the microscope C-mount adapter
- Now the system is ready to be used with the microscope.



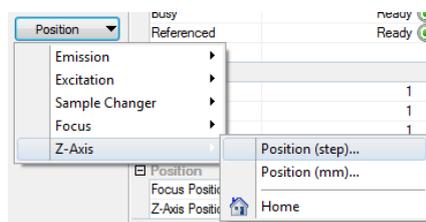
To avoid any damage of the camera or microscope because of a moving camera drive disable the Z-drive in the system configuration (see service manual) or use only applications with sample sizes of 300mm or higher.



Do not operate the NC-xxxE camera without the external fan. Otherwise, the camera will overheat and this will destroy the camera.

Installing the camera

- Remove the power supply cable and the connection cable from the camera. **Discharge electrostatics before touching the connector!**
- Unscrew the camera from the C-mount adapter.
- Move the camera (z-axis) into the low position (step 98000) using the service software or indiGO. Click on **Device State...**, select Position and choose Z-Axis and Position from the dropdown menu.
- Enter 98000 steps at the prompt and press OK to move the camera to the specified position.
- The camera moves down to the working height. Switch off the system after the position is reached.
- Fix the camera with both knurled screws on the camera transport unit. The NightOWL logo / front sticker on the camera must face the front.
- Connect the USB cable and the shorter power supply cable to the camera. The ferrite core (when present) is secured on the camera with Velcro strips.
- Fix both ventilation hoses, if available, to the connection studs of the camera (magnetic catch).
- Switch on the NightOWL.



Do not operate the camera without the connected ventilation hoses. Otherwise, the camera will overheat and this may damage the camera.

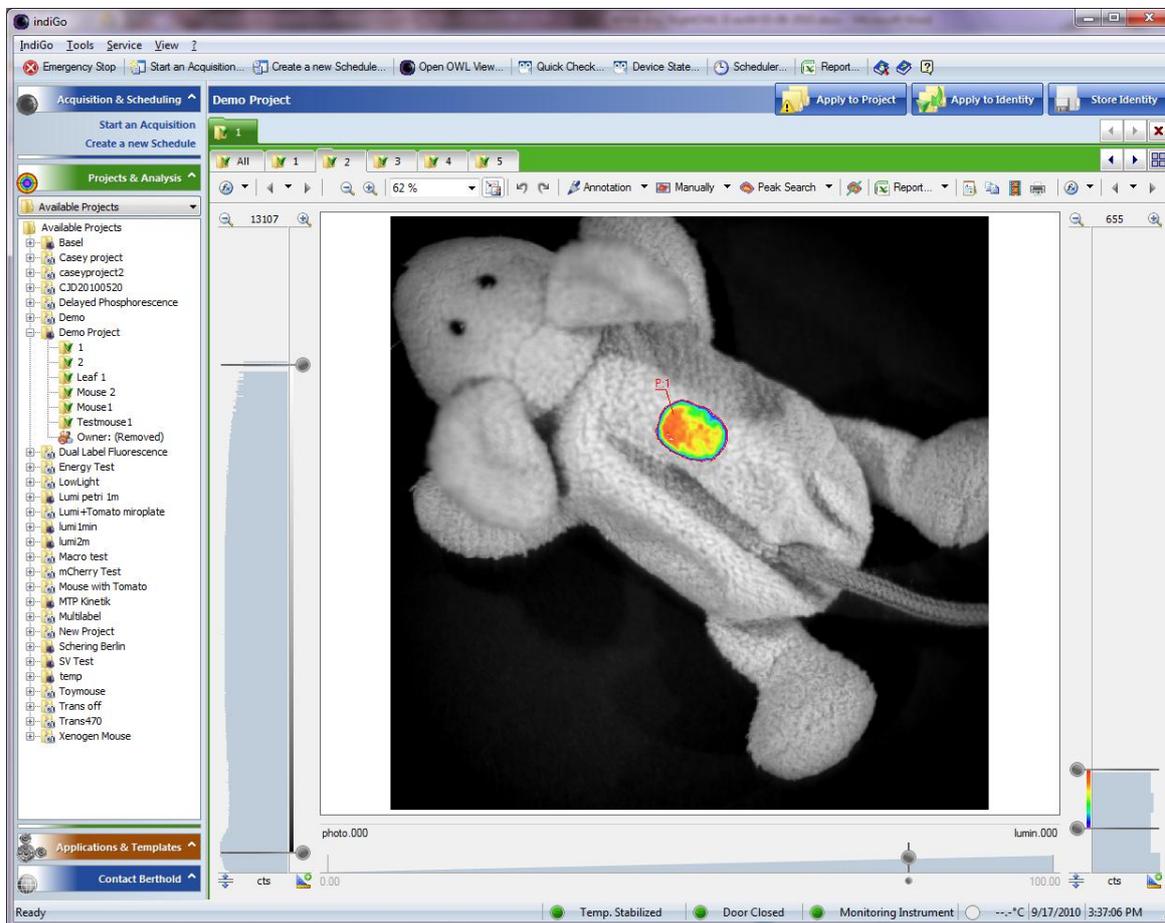
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6.1 Graphical User Interface

The indiGO graphical user interface is clearly structured and offers a variety of setup options.

Measurements are automatically displayed as overlay.



6.2 Application Toolbar



On the toolbar you find the following commands:

- **Emergency Stop**
Stops all axis of the connected NightOWL. The operation will cancel the currently running Measurement. Might force a reset to the NightOWL.
- **Start an Acquisition**
Start a new measurement for the current selected or any other project.
- **Create a new Schedule**
Create a new Schedule for the current selected or any other project.
- **Open OWL View**
Start the indiGO image viewer
- **Quick Check**
Start the <Quick Check> utility to create a photo or run a measurement for test circumstances.

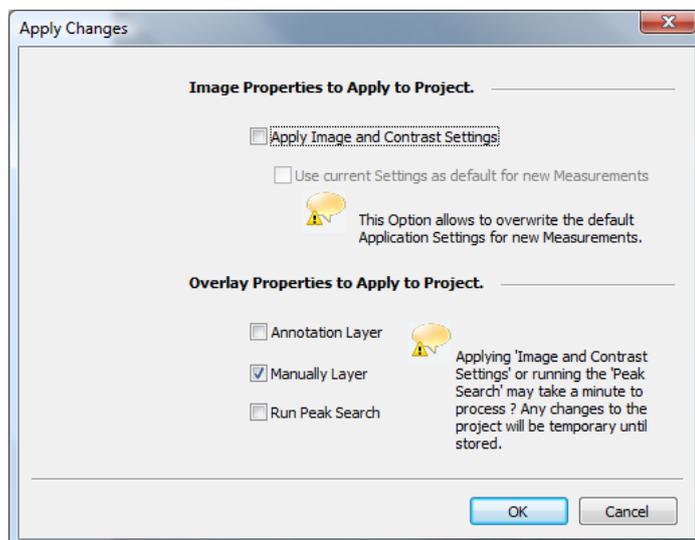
- **Device State**
Open a window to display the current state of the NightOWL.
- **Scheduler**
Open the editor for the Scheduler
- **Report**
Create a report for the current active project
- **Help Search**
Search the online help
- **Help**
Start the online help
- **About**
Display program version and copyright information

6.3 Identity Context



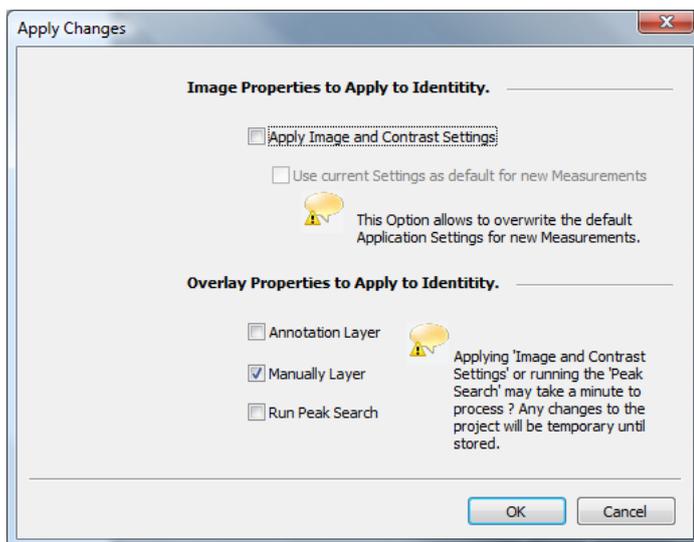
On the left of the context bar the actual selected identity name is displayed. On the right are three quick commands available.

- **Apply to Project**
With this command the current image and contrast settings, as well as the overlay properties of the annotation and the manual layers can be applied to the current project. You also have the possibility to start the peak search for all measurements of the project.



- **Apply to Identity**

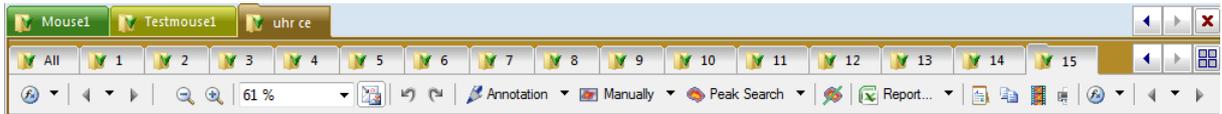
With this command the current image and contrast settings, as well as the overlay properties of the annotation and the manual layers can be applied to all measurements of the current identity. You also have the possibility to start the peak search for all measurements of the identity.



- **Store Identity**

Store all changes made to the identity to disk.

6.4 Identities and Measurements



- **Top Row**
Currently opened identities
- **Center Row**
List of all measurements belonging to the current selected identity
- **Bottom Row**
Measurement or data toolbar

6.5 Contrast Slider

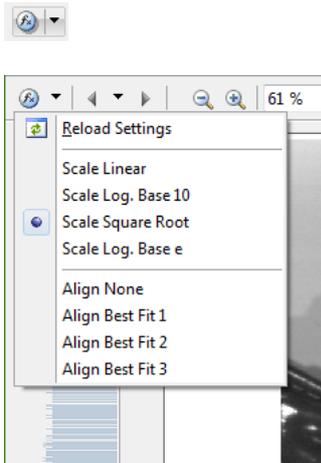


With the contrast slider on the left side of the image the brightness of the photographic display is defined. The top handle sets the upper brightness value, whereas the bottom handle is for the definition lower brightness limit.

The brightness can be scaled using several scaling algorithms and can be aligned automatically. These operations can be reached through the **<Photo Properties>**.

The **<Photo Properties>** can be reached through a dialog or the **<Photo Properties Quick Menu>**.

6.5.1 Photo Properties Quick Menu



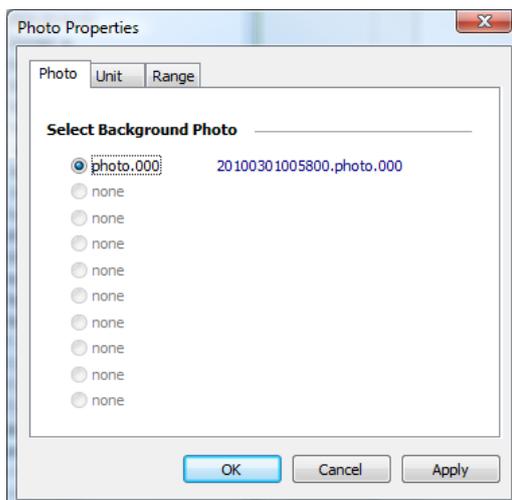
- **Reload Settings**
Reload the last stored settings for the scaling and the alignment.
- **Scale n**
Scale the contrast of the photo using the selected algorithm.
- **Align**
Align the contrast sliders using the selected algorithm.

6.5.2 Photo Properties Dialog



- **Photo**
The Photo page is used to select the active photo.

If a measurement contains more than one photo, the photo displayed with the measurement can be selected.

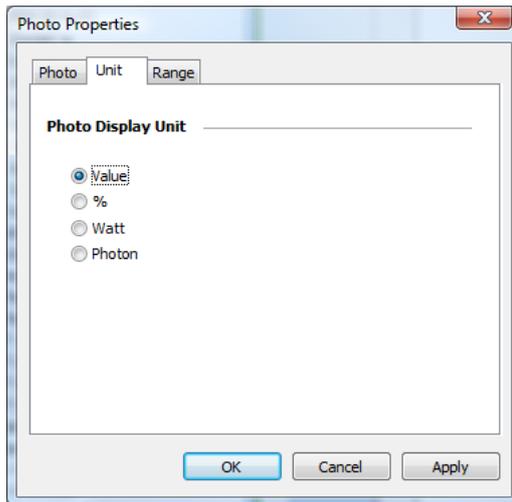


Reference:

The true name of the photo is displayed as a link. In our example: 20100301005800.photo.000, where 201003 is the date the photo was taken. In our example: 03. March 2010. 005800 is the recording time. In our example: 12:58:00 AM. By following the link, the indiGO image viewer will be opened and the photo will be displayed.

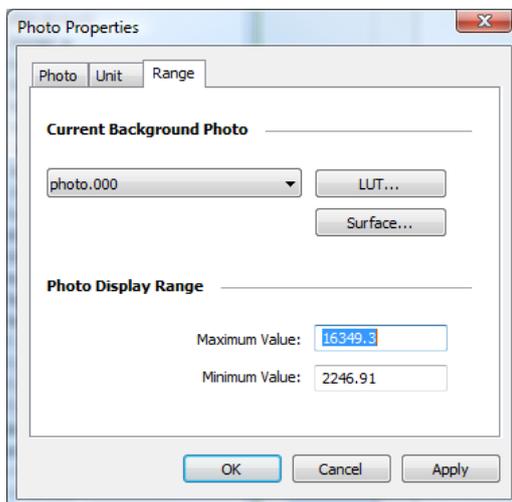
- **Unit**

The Unit page can be used to setup the unit of the contrast slider

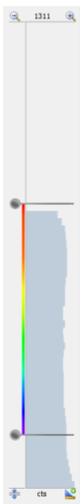


- **Range**

The Range page can be used to setup the contrast slider. For further analysis a LUT and a surface is supported.



6.6 Data Slider



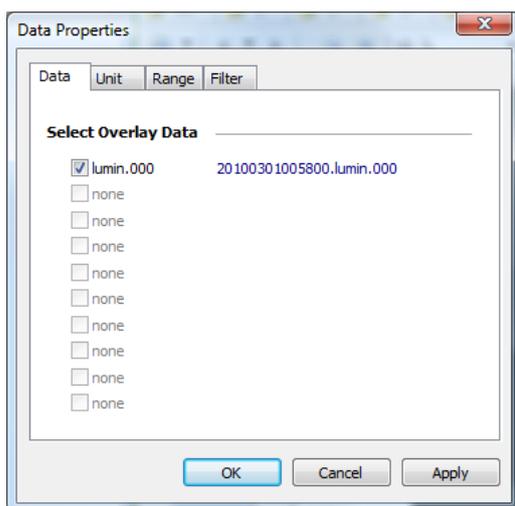
On the right margin of the screen you see the intensity scale of the measurement, together with the associated slider. With these two sliders you can set the scaling of the pseudocolor signal image and the lower threshold of the color view. The top slider defines the intensity value. The top slider defines which intensity value has been assigned to the highest valued color. Values above this threshold are displayed in white. The bottom slider defines which intensity in the signal image is displayed with the lowest valued color. All values below this threshold are not displayed.

6.6.1 Data Properties Quick Menu

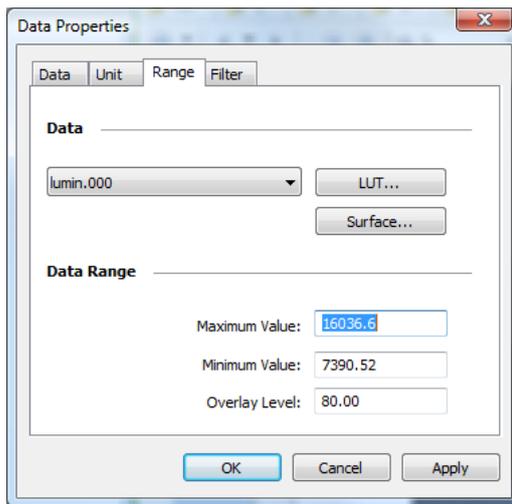
The <Data Properties Quick Menu> supports the the same functions as the <Photo Properties Quick Menu>.

6.6.2 Data Properties Dialog

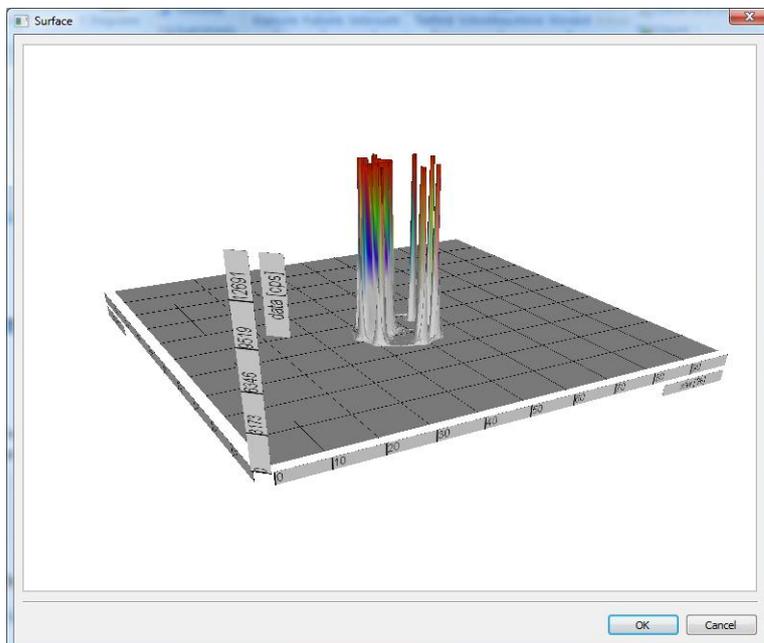
- Data**
 The Data page is used to select the measurements displayed. Each data image recorded can be tagged to be relevant and displayed along with the photo.



- Range**
 The Range page can be used to setup the data slider.

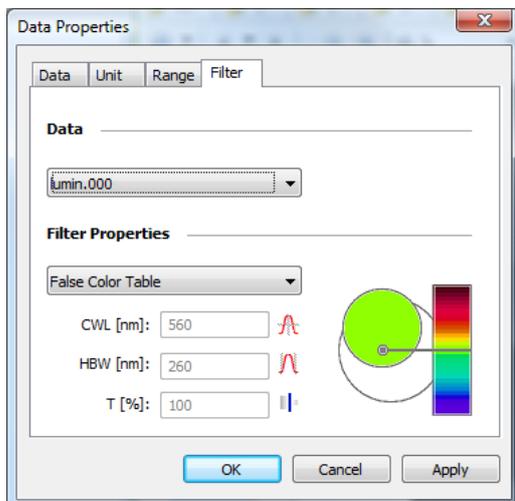


For further analysis a LUT and a surface is supported. In addition the overly intensity can be set through **<Overlay level>**.



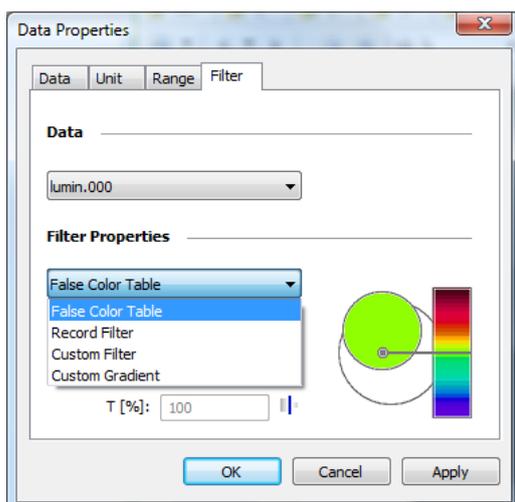
- **Filter**

The Filter page can be used to change or setup the filter properties used to render the overlay.



The following options are available:

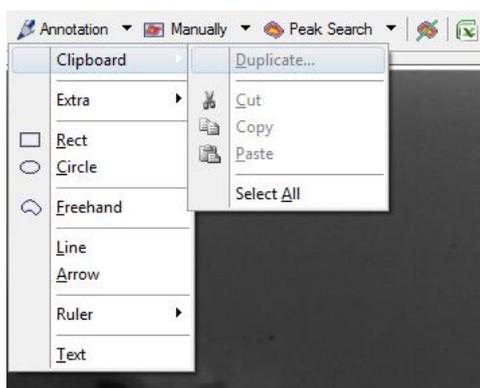
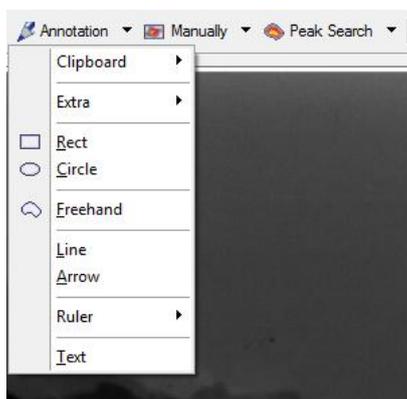
- **False Color Table**
Activates the system default false color table
- **Record Filter**
Activates the filter properties used for recording
- **Custom Filter**
Enables the user to setup a custom filter, using a center wave length and a bandwidth.
- **Custom Gradient**
Enables the user to define a gradient using a center wave length.

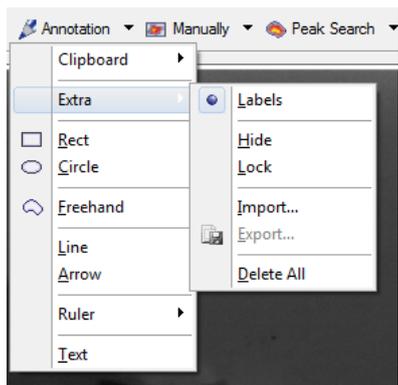


6.7 Toolbar

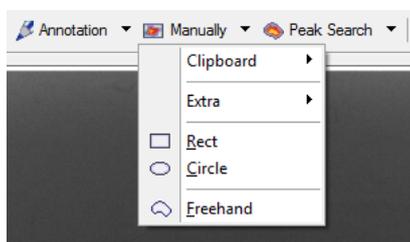


- **Decrease the zoom**
Used to decrement the zoom
- **Increase the zoom**
Used to increment the zoom
- **Current zoom**
Used to setup the zoom manually, displays current zoom factor
- **Align**
Align image into the view; used to calculate a best fit zoom factor
- **Undo (area editing)**
- **Redo (area editing)**
Used for Undo and Redo while area editing is active
- **Annotation (Menu)**
Create annotation areas

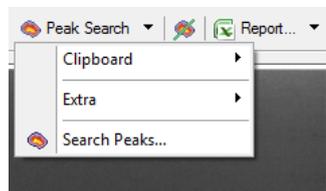




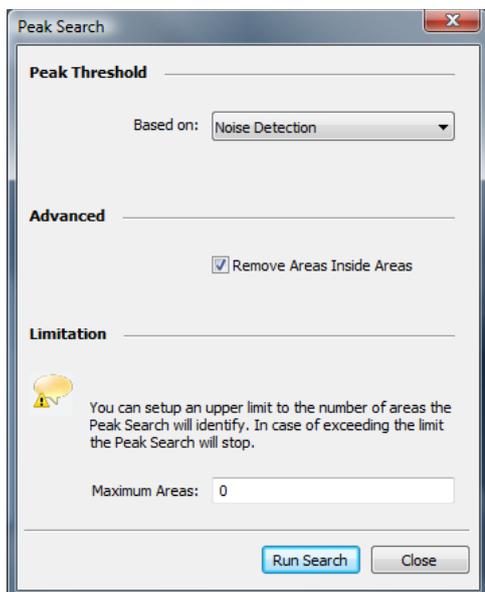
- **Manually (Menu)**
Create manual areas



- **Peak Search (Menu)**
Starts the peak search

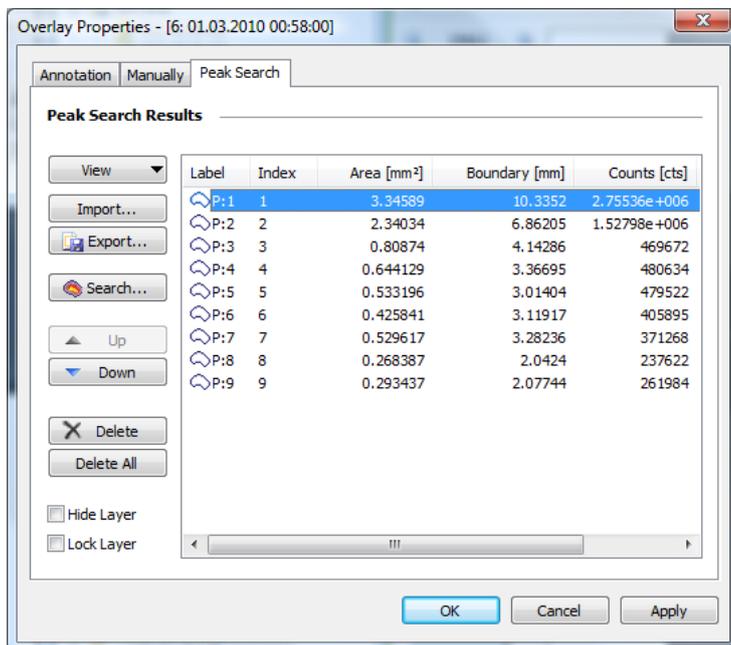


- **Peak Search (Command)**



- **Overlay Properties (Dialog)**

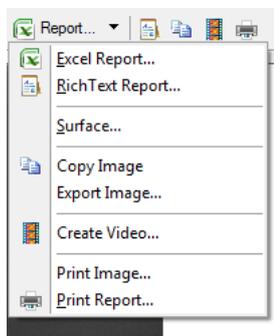
The <Overlay Properties> dialog can be opened through the <Annotation>, <Manually> or <Peak Search> commands



- **Line Plot**

Starts the Line Plot Tool

- **Report (Menu)**



- **Report (Command)**

Starts the wizard to create an Excel report. Same function as <Excel Report>.

- **Export Rich Text Report**

Starts the wizard to export a Rich Text report. Same function as <Rich Text Report>.

- **Copy current view to clipboard**

The current presentation of the measurement will be copied to the clipboard. Same function as <Copy Image>.

- **Render Video**

Starts the wizard to create a video of the measurements. Same function as <Create Video>.

- **Print Report**

Starts the wizard to print a report. Same function as <Print Report >.

In the area below the image there is a separate slider, which can be used to define the transparency of the data images.

6.8 IndiGO Menu

6.8.1 New

Project

To create a new project, start the wizard. For further details please refer to section 4.2.4.

Controller Template

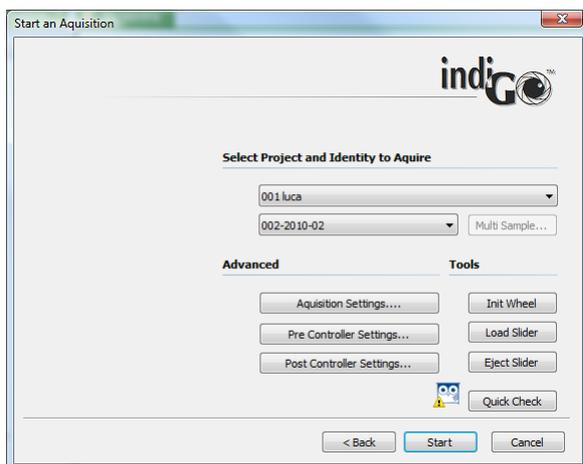
To create a new controller template, start the wizard. For further details please refer to section 4.2.4.

Measuring Template

To create a new measuring template, start the wizard. For further details please refer to section 4.2.3.

6.8.2 Start a new Acquisition

This command will start the acquisition wizard for on demand measurements.



Several quick check commands are available to verify the settings made to the application. For further details please refer to chapter 4.2.5.

6.8.3 Create a new Schedule

The system will start the **<Create a new Schedule>** wizard, which allows you to select the contents you want to schedule first.

For further details please refer to chapter 4.4.3.

6.8.4 Report

indiGO offers the possibility to create and display measurement reports. The output can be adapted to the user's requirements. For further details please refer to chapter 4.4.

6.8.5 Print Image

indiGO offers the possibility to create and display measurement reports. The output can be adapted to the user's requirements. For further details please refer to chapter 4.4.

6.8.6 Print Report

indiGO offers the possibility to create and display measurement reports. The output can be adapted to the user's requirements. For further details please refer to chapter 4.4.

6.8.7 Logoff

This command will change the current user account.



6.8.8 Exit

Quit indiGO to come back later.

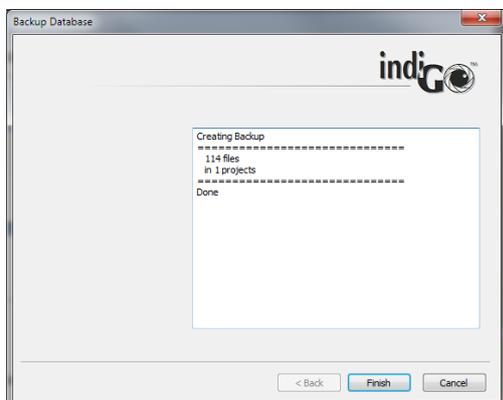
6.9 Tools Menu

6.9.1 Backup Projects

IndiGO can create backups of the database or selected projects. Backups are created using the **backup smart wizard**.



The wizard will guide you through the steps necessary to successfully create a backup. When selecting the Backup first define which projects have to be backed up. Clicking on [Next >](#) leads to the dialog box to select the backup target directory. This should be a remote network drive or removable storage to assure a proper backup. A Backup name can be assigned. This is the name of the file created by the backup (extension zip.dba). Depending on the amount of data and the computer- / transfer performance the backup may take a while. After a successful backup a summary page will pop up.

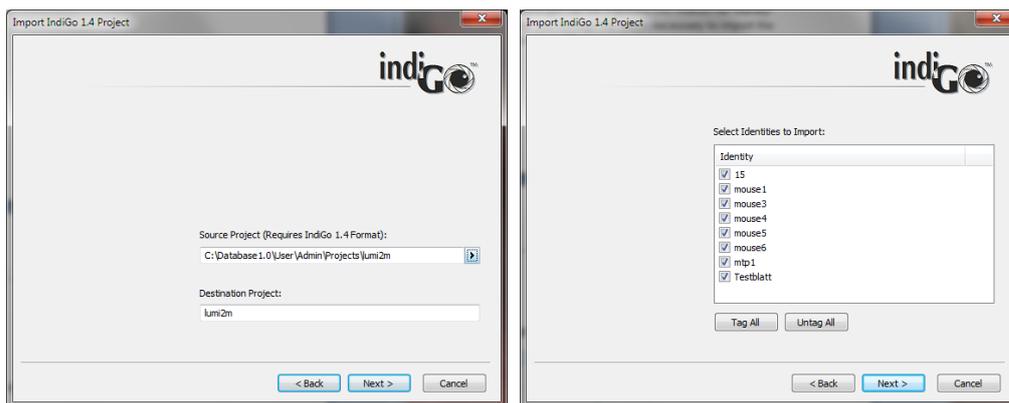


6.9.2 External Tools

indiGO supports some external tools which can be accessed through this menu.

6.9.3 Import indiGO 1.x Project

Projects and measurement data created with indiGO 1.4 can be imported into indiGO for re-analysis via this command. A smart wizard will guide you through the steps necessary to import the data. Please follow the instructions given by the wizard.



After launching the wizard just select the project file (.proj) of the indiGO 1.x project to import. When the standard database location was used, the files can be found using this file structure:
 C:\Database1.0\User\Username\Projects\Projectname\Projectname.proj

The “Destination Project” will define the Project name where the imported files will be copied to. An import project name cannot be used for data acquisitions. Clicking on **Next >** will lead to a selection dialog box. Here you can select the Sample IDs to import. Uncheck the boxes next to the SampleID which should not be imported. The data import will start when clicking on **Next >**. After the successful import a summary page will pop up.

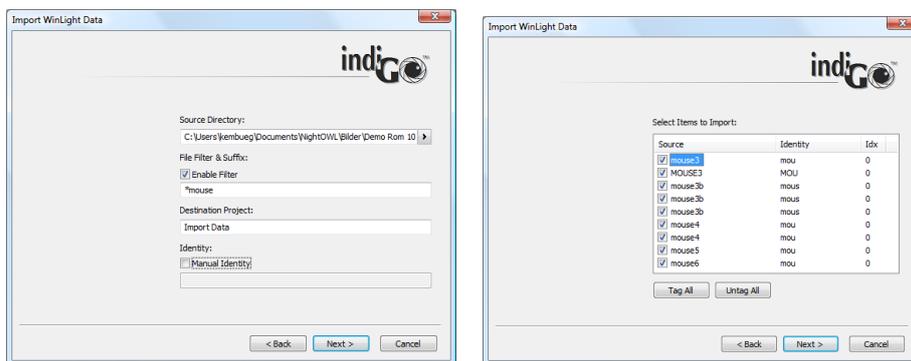
6.9.4 Import Winlight Data

Projects and measurement data created with WinLight can be imported into indiGO for reanalysis via this command. A smart wizard will guide you through the steps necessary to import the data. Please follow the instructions given by the wizard.

The file structure of the files to be imported must fit the file structure of images created by the “ReporterGen” application in WinLight.

Photographic image xxx_yyy-P.fts
 Signal Image xxx_yyy-F.fts

Only image pairs (signal image with “-F” suffix plus photo image with “-P” suffix) can be imported. The prefix (xxx_yyy) must be identical to be identified by the import routine.

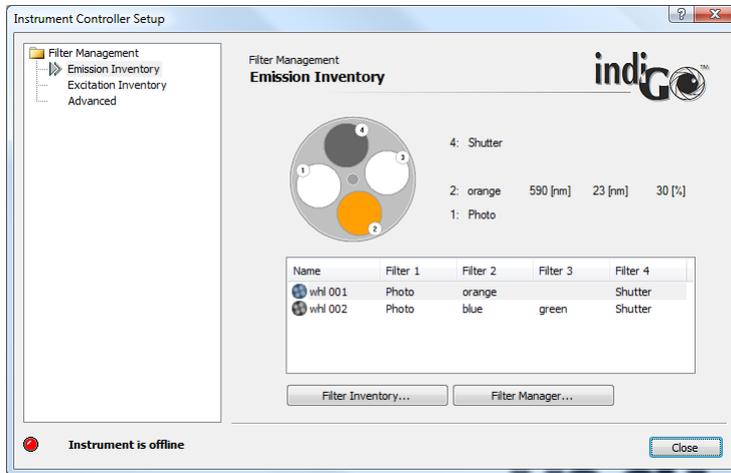


Using this structure xxx will be taken as SampleID (Identity). The 3 digit number yyy represents the sequence image number. The suffix defines the image type (photo -p; signal -f). When checking the “Manual Identity” box. The target SampleID can be set manually and all available image pairs will be shown in the selection dialog box. If an index number shows up more than one time, only the first image in the list with this index will be used for import.

6.10 Service Menu

6.10.1 Filter Manager

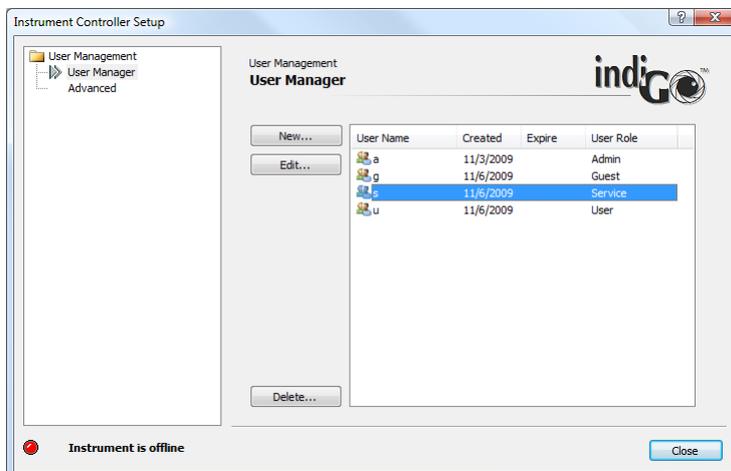
This command will start the indiGO filter manager.



For further details please refer to section 4.1.13

6.10.2 User Manager

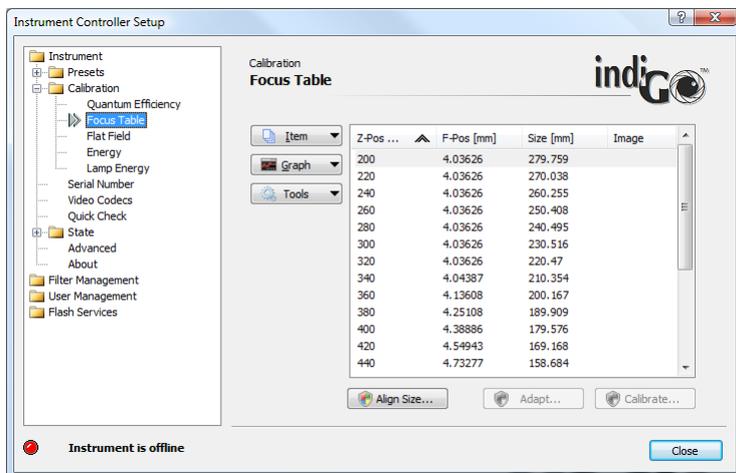
This command will start the indiGO user manager.



For further details please refer to section 4.1.11.

6.10.3 Controller Service

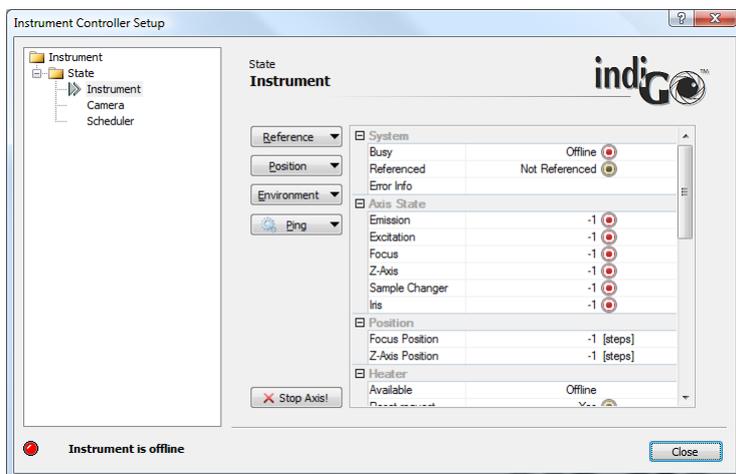
The **<Controller Service>** command will start the **Instrument Controller Setup**.



The Instrument Controller Setup is used to setup your NightShade or NightOwl device and to perform all system calibration tasks.

6.10.4 Device State

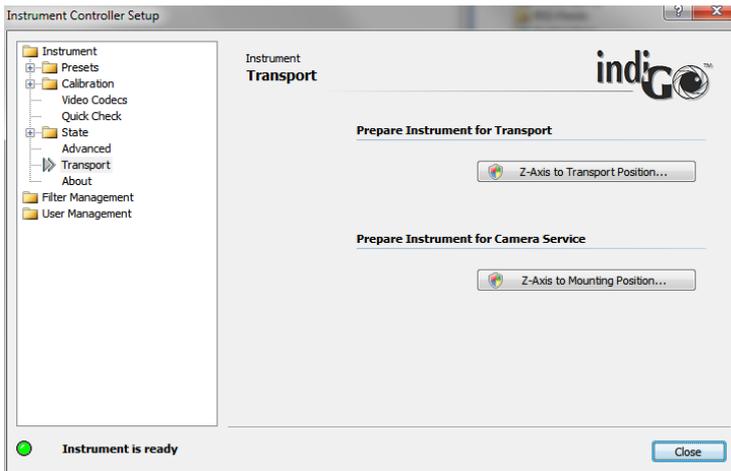
The **<Device State>** command can be used to display the current states of the instrument, the camera and the scheduler.



Raw device commands and test operations can be executed using the context command buttons.

6.10.5 Transport

The "Transport" tab enables the user to move the camera drive (z-axis) to prepare for instrument shipping or service work at the camera.



The button **<Z-Axis to Transport Position>** moves the Z-drive to a transport position in combination with a specific foam piece to ensure a safe transport of the NightOWL. This function even works when the instrument is not equipped with a camera.

Button **<Z-Axis to Mounting Position>** can be used to move the Z-drive to a position where the camera can be accessed.

After clicking the buttons a warning message comes up.

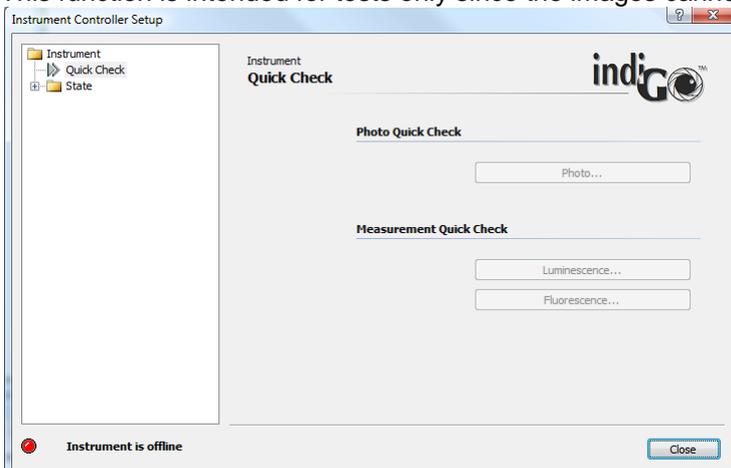


Clicking on **<OK>** will move the camera drive to the dedicated position. After this the controller will be closed when clicking on **<OK>** or **<Cancel>** to continue with the controller.

6.10.6 Quick Check

The **<Quick Check>** command can be used to get access to highlevel quickcheck commands for photo, luminescence and fluorescence.

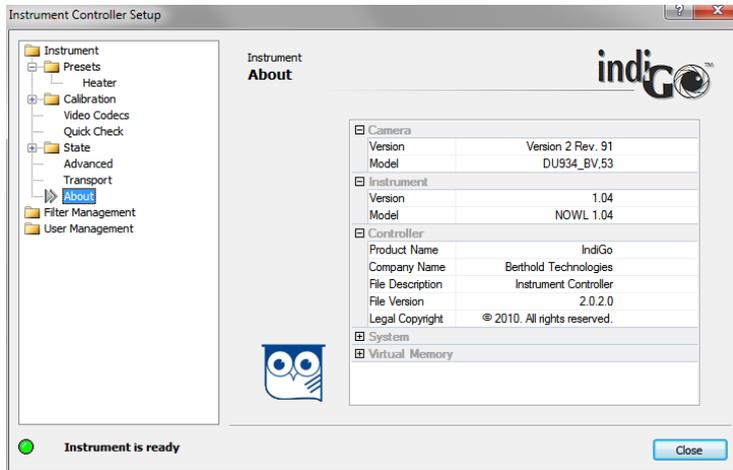
This function is intended for tests only since the images cannot be saved to disk.



Each highlevel quickcheck command will start a smart wizard which will guide you through the necessary parameter setup steps to perform the quickcheck.

6.10.7 Controller Version

The command will display the current controller and instrument version information.

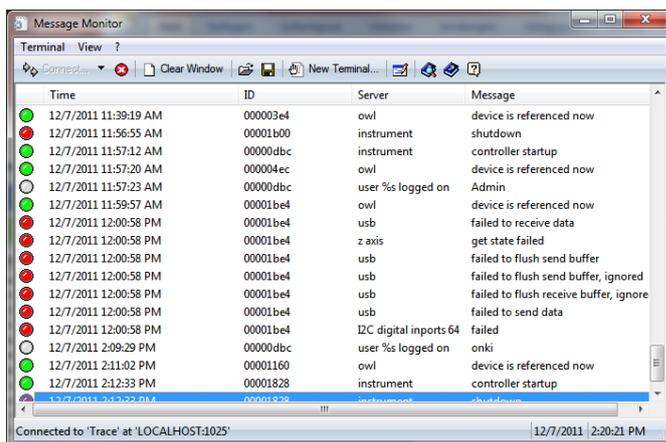


Please note:

Watch the owl while moving the mouse.

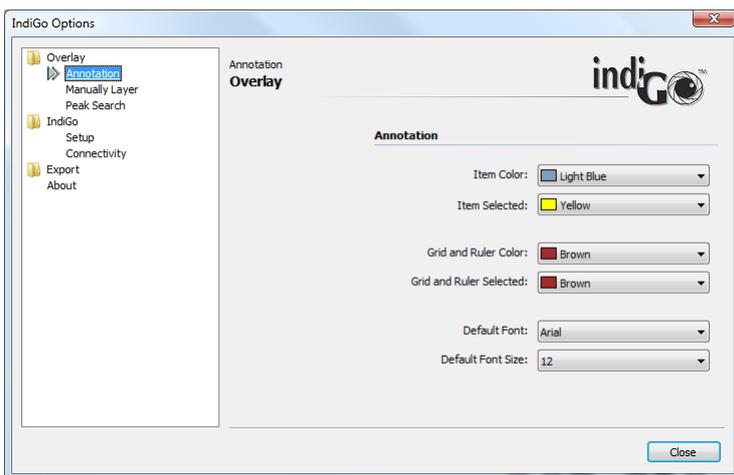
6.10.8 Messages

The **<Messages>** command will start the systems **Message Monitor** which can be used to review internal indiGO trace and error messages.



6.10.9 Options

The Options command allows you to setup further indiGO options.

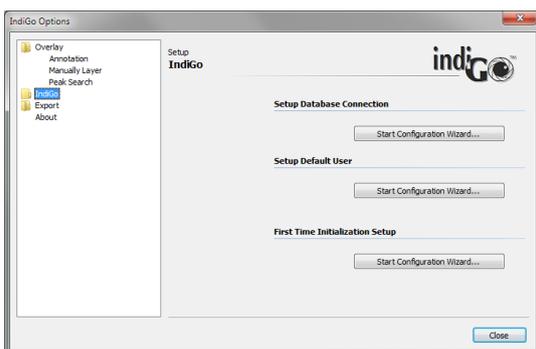


Overlay

Access to overlay colour options

IndiGO

Access to setup configuration wizards and connectivity settings necessary for update and support mail access.



Setup Database Connection

Using this wizard the connection type can be changed. This might be required when the computer was moved away from the system or in case the database was changed from the local disk to a network drive.

Enter the type of connection first (usually direct connection to the instrument) and select the location of the database. If the database is not present at the selected location, a new, empty one will be created.



Finally the connection must be entered. In case of a local connection, the default "LOCALHOST-1024" is OK.



Setup Default User

With this wizard a default user can be assigned who logs in automatically after launching indiGO.



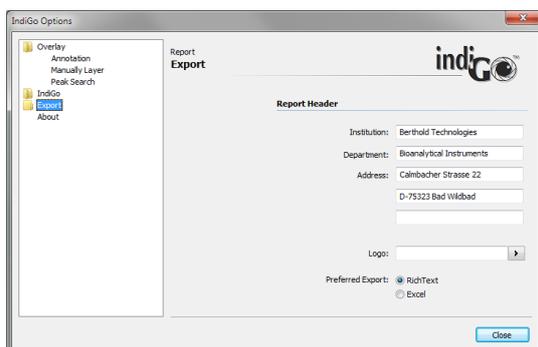
The user management can be disabled completely or a default user who logs on automatically at program start can be assigned.

First Time Initialisation Wizard

This button will start the initial initialization. See chapter **Fehler! Verweisquelle konnte nicht gefunden werden.** for details

Export

Export report settings like address, company logo and preferred export format.



6.11 View Menu

6.11.1 Toolbar

This command shows or hides the toolbar.

This option is not persistent and the toolbar will be shown on the next start of indiGO.

6.11.2 Statusbar

This command shows or hides the status bar.

This option is not persistent and the statusbar will be shown on the next start of indiGO.

6.11.3 Scheduler

Open the editor for the scheduler. For further details please refer to section 6.2.

7 Trouble Shooting

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7.1 Hardware

7.1.1 What to do if collisions occur?

If a collision of the camera lift with the sample or the sample carrier has occurred, a micro switch stops the lift movement immediately. In this case, the IndiGO software shows a message that a collision has occurred and provides information to remedy the error.



The following options are available:

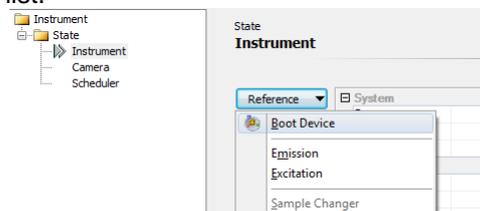
- The software proposes to move the camera up completely and then reset the other devices (focus drive, emission filter wheel) to get back to normal operation. Chose this option if you are sure that the camera drive unit has not yet got stuck. The camera drive unit should still be capable of running if the lower bottom plate of the camera fixture is still resilient, i.e. has not yet reached the mechanical end stop. The system is ready for operation after the reset is completed.
- No further action is proposed, the program continues and the collision can be remedied manually by switching off the instrument and move the camera drive manually. This approach should be chosen if the drive unit got stuck; in this case, click on .

Proceed as follows to remedy a collision.

7.1.2 Camera Lift Sits on a Sample Carrier

1. Slightly raise the resilient bottom of the camera lift and pull out the sample carrier.
2. Now turn down the lift slightly, the micro switch is triggered and the blockage is removed.
3. Reboot the system by switching off the NightOWL and turn it back on after a couple of seconds:

Alternatively the instrument can be rebooted through the software by clicking on in the toolbar and selecting **<Boot Device>** from the **<Reference>** dropdown list.



The camera transport unit is now moved to its home position (very top).

4. Continue work and check why the collision occurred to avoid further problems. Remove the obstructing object if required.

7.1.3 Camera Lift Sits on the Bottom of the Acquisition Chamber

Turn the spindle on the camera transport unit to the right so that the lower level of the camera transport unit moves up. This will create so much clearance that the blockage is removed and the camera can be controlled again via the software.

Set the home position as described above (step 3).

7.1.4 Camera Lift Hits the Ceiling of the Acquisition Chamber

Take the bottom plate out of the acquisition chamber. You may hold it on both slants on the side.

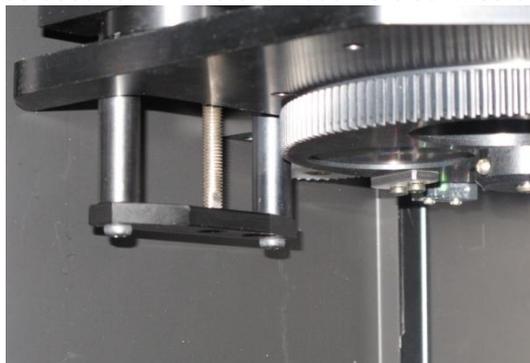
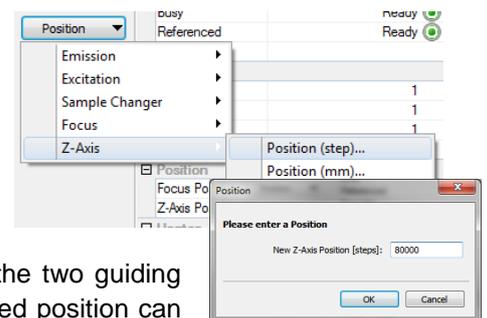
Turn the spindle that moves the camera lift to the left. This will move the lift slightly down so that the blockade is eliminated and the camera can be controlled again by the software.

Set the home position as described above (step 3).

7.1.5 Focus drive blocked

In rare case the focus motor could be blocked at the home position due to a improper initialisation. In this case the focus axis gets stuck at the mechanical end stop and cannot be moved by the motor. The initialisation fails and the focus can no longer be used. As a result all images are out of focus. To remove the blocking proceed as follows.

- Remove all accessories (ring light, heated table etc.) from the baseplate of the NightOWL.
- Switch on the NightOWL and wait until the init procedure is finished. Due to the blocked motor the init will be finished after a 2 minute timeout.
- Launch indiGO and login with a valid administrator account.
- Move the camera (z-axis) into a low position (step 80000) using indiGO. Click on  Device State..., select Position and choose Z-Axis and Position from the dropdown menu.
- Enter 80000 steps at the prompt and press OK to move the camera to the desired position.
- Switch off the NightOWL II and do not turn it on again since it will move back to the home position.
- The shaft who moves the focus drive is located between the two guiding rails. At the lower position the shaft is flattened. This flattened position can be used to turn the shaft counterclockwise using a plier or a similar tool to lower the focus drive.



Turn the shaft until the focus drive moved down approx. 5 mm.

- Turn on the NightOWL and watch if the focus drive is homing properly. The focus drive must run up until the home position switch is reached. Then the drives moves back a few steps to finish the initialization.

7.2 Software

7.2.1 Surface plot not visible

When running the surface plot from the Report menu a box with an error message (D3D device error) pops up instead of the surface plot. This indicates that the installed graphics card or the corresponding driver does not support Microsoft Windows DirectX 9 features.

In this case a driver update will solve the problem since many older PC do not have the latest drivers installed. In case the graphics card does not support DirectX 9 a new graphics card is required.

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8.1 Camera and Lens

8.1.1 Cleaning the Camera Box/Removing the Bottom Plate

The camera box itself should only be cleaned using a mild detergent and a lint-free tissue or a vacuum cleaner. To this end, the bottom plate which is held by two magnets can be removed.

When inserting the bottom plate, make sure that the rear pegs for positioning the bottom plate will be inserted into the appropriate recesses in the dark box. If not, the bottom plate will be installed slanted and this may cause focusing problems.

8.1.2 Cleaning the Camera

- Clean the camera only with pressurized air spray or optical paper!**
- Remove the camera for cleaning.**

Positioning the camera at working height

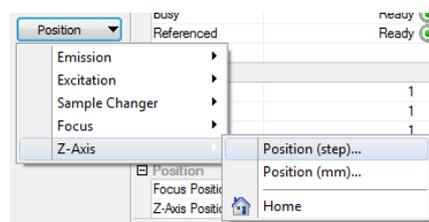
Move the camera transport unit to a height that allows you to easily remove the camera (several centimeters above the bottom plate).

- Open the door of the acquisition chamber to check the movement of the camera transport unit. Check that there is no sample tray or any other device which may block the camera movement.



○ **Do not reach into the acquisition chamber while the transport unit is moving!**

- Move the camera (z-axis) into the low position (step 98000) using the service software or indiGO. Click on  Device State..., select Position and choose Z-Axis and Position from the dropdown menu.
- Enter 98000 steps at the prompt and press OK to move the camera to the specified position.



Dismantling and cleaning the camera

- Unscrew both screws fixing the camera to the transport unit.
- Carefully lift the camera off from above.
- Do **not** detach the cable from the camera.
- Start an acquisition with long exposure time via the software. This opens the camera shutter at the bottom, so that you can remove dirt particles.

Caution: do not damage the shutter!

- Clean the camera using pressurized air spray.

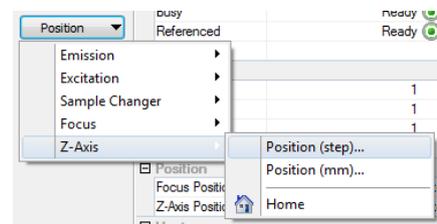
Installing the camera

- Install the camera with both screws to the transport unit. The port must face the camera lift.

8.1.3 Cleaning the Lens

The lens can only be cleaned if no filter wheel is installed. It should only be cleaned using pressurized air spray or cleaning agents available in photo shops!

- Move the camera transport unit to the working height, i.e. so high above the bottom plate that you can easily reach the lens from below.
- Therefore move the camera (z-axis) into the low position (step 60000) using the service software or indiGO. Click on  Device State..., select Position and choose Z-Axis and Position from the dropdown menu.
- Enter 60000 steps at the prompt and press OK to move the camera to the specified position.
- Pull off the filter wheel from below so that the underside of the camera lens is accessible.
- Clean the underside of the objective. Make sure there are no residues (dust, cleaning agent) on the glass surface of the lens.
- Install the filter wheel again. Make sure that the filter wheel audibly clicks into place.
- Move the camera to the lowest position possible.
- Unscrew both knurled screws fixing the camera to the transport unit.
- Carefully lift the camera and clean the top side of the lens. Make sure there are no residues (dust, cleaning agent) on the glass surface of the lens.
- Carefully place the camera onto the transport unit again.
- Fix the camera with both knurled screw to the transport unit.
- Turn the NightOWL II off, wait about 5-10 seconds and then turn it on again. The device will be initialized new.



8.2 Darkbox

8.2.1 Replacing the Air Filter

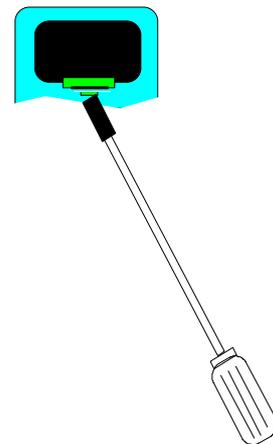
The air filter should either be cleaned or replaced, depending on the level of contamination. Remove the black ventilator cover on the rear of the instrument and clean the filter (blow it out or wash it) or replace it.

8.2.2 Replacing the Fuse

The mains fuses are located on the rear panel of the *NightOWL II*. The fuse holder and the mains connection socket are one unit.

Proceed as follows

- Pull the power cord.
- Insert a screwdriver from below into the opening of the fuse inset.
- Pull out the fuse inset with the screwdriver like a drawer.
- Replace the fuse depending on the line voltage.
- Insert the fuse holder again until it clicks into place.



+ ***Use only fuses that match the value and the line voltage indicated on the device.***

on the

8.2.3 Setting the Door Sensor

In case the sensor on the door frame should be displaced so that there is no contact although the door is closed, you can easily re-adjust the sensor as follows:

- Open locking screw at the bottom of the sensor using a 1.5mm Allen key.
- Using a thin tool (nail), push the sensor out so much that it protrudes by about 1 cm. Do **not** tighten the locking screw.
- Carefully close the door and lock it so that the sensor is pushed through the door into the correct final position.
- Open door carefully again and tighten the locking screw.

9 Technical Data

Camera	Peltier/air-cooled slow scan CCD camera C-Mount adapter Height can be changed by the software to change imaging size and focusing .
Resolution	1024 x 1024 Pixel x 13,6 μ (back illuminated NC-100 Camera) 2184 x 1472 Pixel x 6.8 μ (front illuminated NC-320 Camera)
Quantum efficiency (max.)	90% (NC-320 85%).
Noise	Readout: Σ 7 e ⁻ RMS (NC-320 12 e ⁻ RMS)
Exposure time	from milliseconds to hours
Binning of pixels	Variable in X- and Y-direction to increase the signal/noise ratio
Temperature	Ambient temperature during operation: 10° to 30° C (NC100em max. 25°C) Cooling temperature - Δ 80°C (NC-100) - Δ 60°C (NC320) Ambient temperature during storage: -20° to 70° C No condensation
Lens	NC-100: standard: 25mm f = 0,95 NC-320 standard 25mm f = 1.6 C-Mount adapter
Sample chamber	
Illumination	internal illumination can be adjusted via software white light fluorescence illumination (400-800 nm)
Max. sample size	250 mm x 250 mm (NC-320 300 x 250mm)
Min. sample size	30 x 30 mm with standard lens (NC-320 30 x 40mm)
Dimensions	Acquisition device: 600 mm x 1220 mm x 400 mm (WxHxD) Camera head: 110 mm x 175 mm x 110 mm Sample chamber (inside): 400 mm x 380 mm x 450 mm
Weight	approx. 90 kg (depending on version)
Operating voltage	115-240VAC; 50-60Hz
Power rating	600VA, (max. 200VA through internal power socket)
Fuse	250V T 6,3AL
Computer	Minimum requirements: Standard PC with min 3 GHz Pentium processor (MultiCore recommended) 2 GB RAM. Free USB 2.0 port graphics card with 1280x1024 pixels resolution 32 bit colors, DirectX 9c Support 17" color monitor, Windows XP, Vista or Windows7 (x86 or x64) ink-jet or laser printer

10 Appendix

10.1 Accessories

10.1.1 Transilluminator



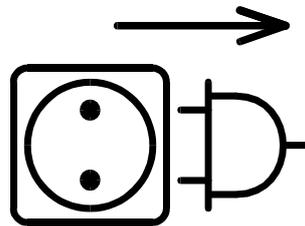
General Safety Instructions

Make sure to use a grounded mains outlet when connecting the transilluminator to the power supply!

Connect the transilluminator only to the power supply specified on the type label of the device!

Never leave the transilluminator powered up without any supervision!

Pull the power cord before carrying out maintenance and repair work and make sure that all parts of the device you may possibly come into contact have cooled down to room temperature!



**Pull
power cord**

Different types of transilluminators are available. For this reason, there are different safety instructions which have to be observed strictly.

a) UV Transilluminators

If you are working with UV transilluminators, it is extremely important that optimum protection of skin and eyes will be guaranteed. You should wear UV safety glasses or a UV face protection mask. Please protect your arms and hands as well by wearing long-sleeved clothing and gloves.



UV - Strahlung

Beware of
ultraviolet radiation



Use eye protection

b) **Blue Light Transilluminators**

No special UV protection is required for blue light transilluminators. The tubes used in the blue light transilluminator have an emission wavelength of 400 - 480 nm. These tubes are also used, for example, to check paper money in banks and industrial facilities.

The health hazard caused by these tubes is low. The UV-A intensities are reduced by 2 filter glasses.

c) **White Light Transilluminators**

No UV protection is needed for white light transilluminators. Nevertheless, make sure to wear standard safety glasses due to the high intensity of the light source. These safety glasses ensure that bright, intense light intensity will not be harmful to the eye of the beholder. All safety glasses that reduce the light intensity by approx. 50% can be used.

Every transilluminator may be operated only by persons who have been trained and instructed accordingly and who possess the appropriate authorization. These persons must be familiar with the user's manual and act in accordance with the instructions contained therein. The respective competence of the operation personnel have to be defined clearly.

Please observe these safety instructions strictly to avoid any health hazards.

Installation of the Transilluminator

Place the device feet of the transilluminator into the four dents in the bottom plate of the NightOWL II. This ensures that the transilluminator is always positioned perfectly. Install the transilluminator such that the power switch is facing the front.

Plug the enclosed power cord into the lower of both mains sockets on the rear, right side of the dark box.

Once the transilluminator has been installed, you have to – due to the height of the transilluminator – enter a focus height (sample height) of 103 mm plus the height of the sample used.

10.1.2 Macro Measurement Table

The macro measurement table is used for measurements in the close-up range if you are working with very small samples. Due to the elevated position of the table, the camera can move closer to the object. This permits smaller image formats up to 30 x 30 mm. Due to the height of the macro measurement table you have to add the table height of 40 mm to the sample height when you enter the focus height.

To position the macro measurement table, push the front device feet made of rubber into the bolt heads located on the bottom plate. This ensures that the table is always fixed in the same position. The table is installed such that the recess for the camera drive unit on the table is facing left.

If you are working with the heated macro table, plug the connector into one of both 9-pole Sub-D connectors on the rear left side of the darkbox. The device must be off, since after power on of the NightOWL the heating system is detected and may get initialized. If the heating system is plugged in during ongoing operation, it will work only after the device has booted up again.

After approx. 5-10 minutes the heated macro measurement table has reached its working temperature (typically 37°C). To modify the initial temperature refer to the service manual.

10.1.3 Ring Light

The ring light is used to illuminate non-reflecting fluorescence samples.

The height adjustment allows adjustment of the ring light to the respective sample size for optimum illumination. For adjustment, open the toggle screw and move the ring light to the desired position. Then tighten the toggle screw again to fix the current position.

Plug the fiber optics connection into the transfer port in the right, upper section of the dark box of the NightOWL. It ensures reliable light coupling. In addition, the connection can be secured against inadvertently coming loose by the toggle screw at the transfer port.



Please note that the sample size should be not smaller than 130mm when using the ring light in nominal position since smaller position will lead to a lens collision.



10.1.4 Line Light

The line light is used to illuminate reflecting fluorescence samples. Reflections on the sample are ruled out by the fact that the lights are positioned at the side. The angle of illumination can be set by adjusting the two lights. To this end, you have to open the knurled screws and move the fiber optics lights to the desired position. Make sure that both lights are in the same position relative to each other to avoid irregular illumination conditions.

Plug the fiber optics connection into the transfer port in the right, upper section of the dark box of the NightOWL. It ensures reliable light coupling. In addition, the connection can be secured against inadvertently coming loose by the toggle screw at the transfer port.



10.1.5 Goose Neck Light Guide

The goose neck light guide is used to illuminate very small samples or plant parts. Thanks to the two flexible arms it can be employed universally and can be adapted to the respective illumination tasks.

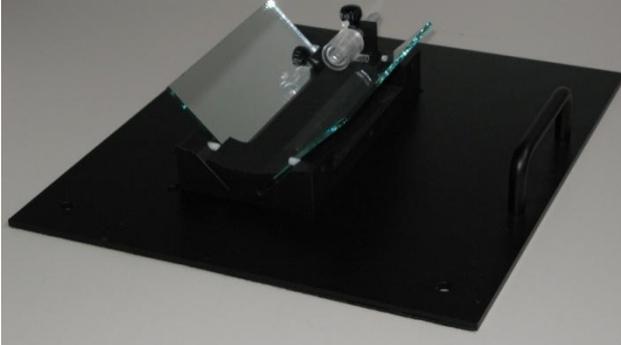
The two light exit opening should be placed such that they are outside the image acquisition range.

Plug the fiber optics connection into the transfer port in the right, upper section of the dark box of the NightOWL. It ensures reliable light coupling. In addition, the connection can be secured against inadvertently coming loose by the knurled screw at the transfer port.



10.1.6 3D-Orthogonal Mirror Table

The 3D Orthogonal Mirror Table is used to measure an animal from 3 side simultaneously. This is done through a specific mirror setup.



The Mirror assembly is located on a special carrier. This carrier is placed on a base plate which is positioning the carrier under the camera. On the carrier there is a single anaesthesia mask to anaesthetise the animal during the measurement.

To install the base plate place it on the NightOWL base plate and center the plate in such a way that the 2 fitting bolts fit in the 2 holes at the plate. Connect the 2 gas supply tubes with the inner part of the gas flange to allow the gas flow to the anaesthesia masks.

Apart from the 5 fold anaesthesia tray the gas supply is switched through the manifold on the vaporizer rack because the mask is not equipped with an individual valve. When the mask is not used close the valve at the vaporizer rack.



As sample format select a sample size of 130mm. The sample height should be set to 25mm plus the half of the height of the measured animal. This means with an animal height of 20mm a sample height of 35mm.

10.1.7 Test Light Source

The Test Light Source is used to calibrate and test the System..



It contains a low light source which will glow for about 15 min. without external supply. To charge the unit, use the included Mains adapter. Charging is indicated by a red LED on the test plate. As soon as the plate is fully charged, the green LED will light. It takes about 1-2 minutes to charge the plate.

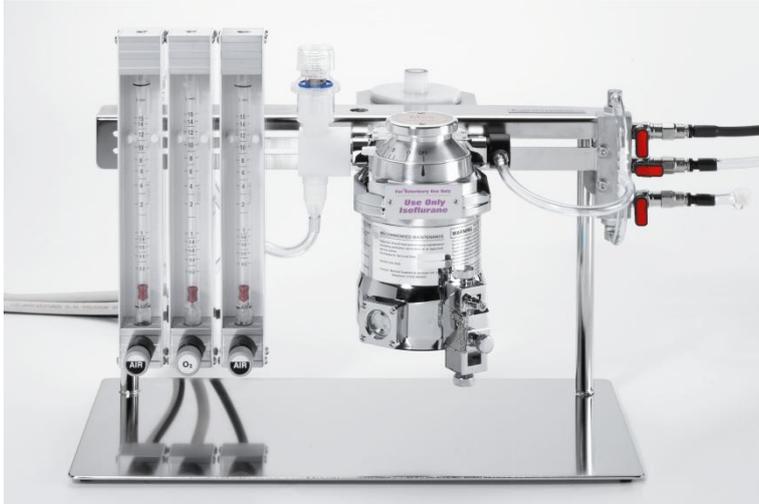
Now the plate is ready to be used in the NightOWL. The spot with the white reflector (microplate position E9) emits light with an energy of approx 20nW. This spot can be used to check the NightOWL calibration. The measuring time should not exceed 1 second since the camera could be saturated otherwise.

Position E6 gives a lower signal intensity. This position can be used to check the detection limit with additional neutral density filters on top of the light source.

The sample size should be 130mm with a sample height of 14mm. A special center plate is optionally available to place the E9 light spot at the center of the image.

The required light position is controlled through the sliding switch at the side of the plate (position E9 -> overl.; E6 -> 96). When the plate is not in use put the slider switch to position „OFF“.

10.2 Gas Anesthesia Unit



The gas anesthesia unit is designed to anesthetize rodents while measuring them in the NightOWL. A version for 3 and 5 animals is available. The unit consists of the following modules:

- Sample table with gas masks.
- Vaporizer rack with flow meters.
- Induction box (also called KnockOut box) to initiate the animal anesthesia.
- Oxygen supply (medical oxygen).
- Pressured air supply (compressor).
- Vacuum controller with carbon filters.

Isoflurane is used as anesthetic. Please observe the respective instructions when working with Isoflurane.

The vaporizer rack has to be cleaned and checked once a year, either by the manufacturer of the vaporizer rack or by an authorized service partner.

Oxygen can be supplied from a gas bottle with pressure reducer or a central supply. An input pressure of approx. 1-2 bar is required. The max. flow rate is about 3 liters per minute at full capacity of the system. The tubing consists of a special oxygen tube with an inner diameter of 6mm. This tube must be connected to the pressure reducer or the central supply. An appropriate adapter must be provided.

The remaining anesthetic is filtered from the exhaled air by activated carbon filters. This filtering does not work anymore if the filters are saturated. For this reason, a third safety filter is installed at the outlet to prevent this.

New filters have to be weighted in any case and their empty weight has to be noted on the filter.



If the weight of the filter increases by 50 g, it is saturated and has to be replaced.

The safety filter should also be checked from time to time (re-weigh it).

➔ *The compressor is designed to operate only 15 minutes followed by pausing 15 minutes. In normal operation this is given. Do not operate the compressor longer than 15 minutes without interruption.*

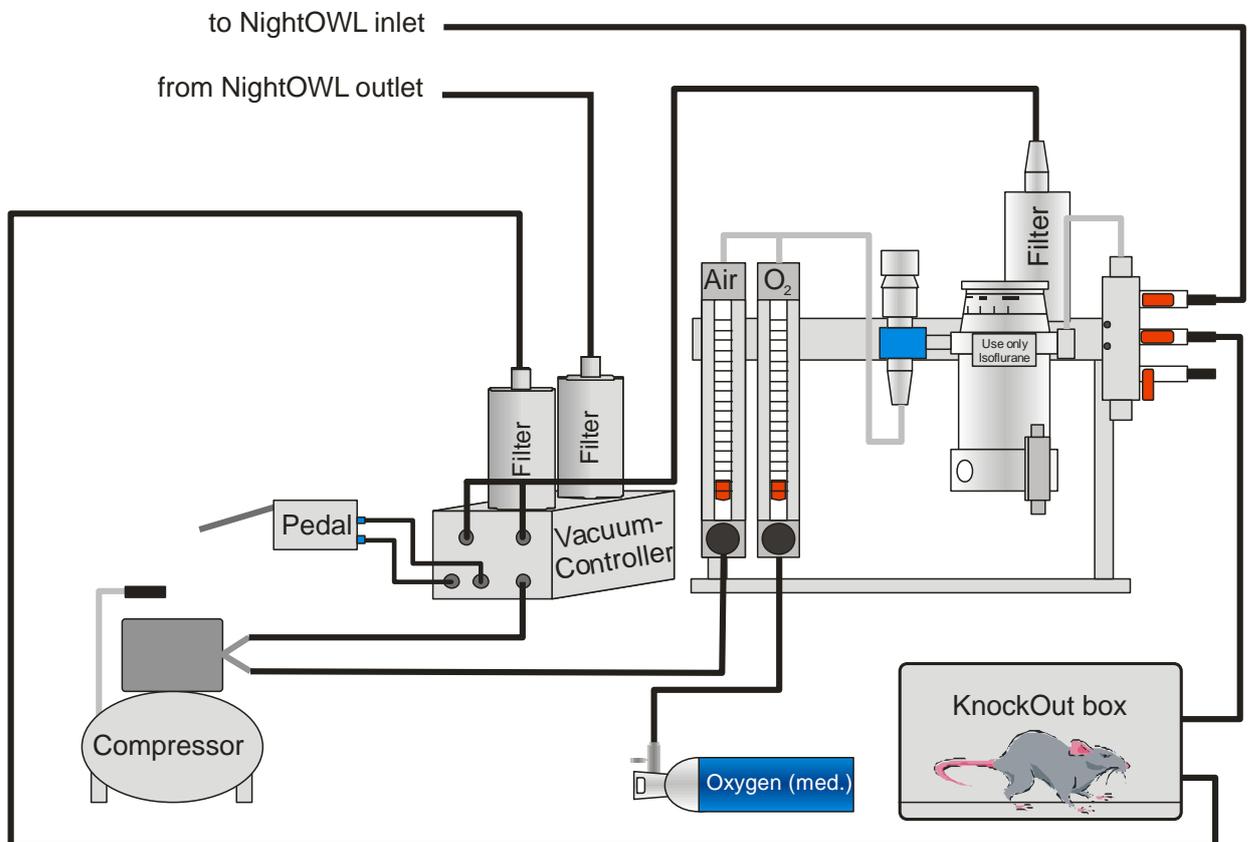
10.3 Installing the Gas Anesthesia Unit

The modules for the gas anesthesia unit are preassembled. Only a few tubes have to be connected. The function of the unit is described in a short functional description:

The incoming pressured air is regulated at the flow meter and mixed with the oxygen after having passed through the flow meter. This mixed air / O₂ passes the vaporizer where Isoflurane is added. This mixture is either distributed to the NightOWL or to the induction box via the stainless steel valves at the vaporizer rack. Both outlets (NightOWL and induction box) lead to the carbon filters of the vacuum controller.

The vacuum controller is driven by the pressured air as well. A vacuum is generated to suck off the gas through the carbon filters in order to remove the Isoflurane from the air. The common outlet of the vacuum controller leads to another carbon filter to remove possibly remaining Isoflurane from the air. The foot pedal activates the sucking off procedure of the induction box to get the gas out of the box before opening.

Schematic diagram of the gas anesthesia unit



10.3.1 Simplified Anesthetic Protocol for Rats and Mice

Before starting

- Check if vaporizer is full. Fill up if necessary (see instructions for vaporizer rack).
- Check weight of the activated carbon filters. Each filter whose weight has increase by more than 50 grams must be replaced (incinerated).



If you are using filters whose weight has increased by more than 50 g, the anesthetic cannot be filtered out of the air anymore and will get into the ambient air (ventilation may be required). Do not forget safety filter.

- Check and, if necessary, close compressor bleed screw.
- Turn on the compressor engine (black button) and set the oil separator (green button). After the compressor engine has been turned off automatically, the storage container is filled and the compressor is ready for operation.
- Check compressor outlet pressure is adjusted to 2.5 bars (manometer under filters).
- Turn on the oxygen bottle.
- In your NightOWL, turn on INLET and OUTLET valves of each mask that will receive an animal.
- Check if the compressor vacuum manometer connected to the induction box is adjusted at its maximum. Press pedal to check the vacuum.

Anesthesia induction

- Place animal(s) in the induction box.
- On the inox bean holder is a 3 way gas distributor. Turn on the floodgate that stream the induction box.
- Adjust AIR flow meter to 1 liter / minute (maximum 3 liters / minute).
- Adjust vaporizer to 4% (maximum 5%).
- Wait until the animal is anaesthetized.

Anesthesia relay from induction to maintenance

- Adjust vaporizer between 1.5% to 3% (depending on the species anaesthetized).
- Adjust oxygen flow meter to 0.2 liter / minute for each mask (for 3 masks → 0.2 * 3 → 0.6 liter / minute).
- Turn off the AIR flow meter.
- Adjust exhauster flow meter connected to NightOWL mask(s) to 0.2 liter / minute for each mask (for 3 masks → 0.2 * 3 → 0.6 liter / minute). If required, increase flow at the vacuum controller (green button). The flow rate can be checked on the flowmeter located at the vacuum controller or at the rack (depending on the revision of the anesthesia system) The flow must be regulated at the vacuum controller.



If the 3rd flowmeter is mounted to the rack (revision with 3 flowmeters on the rack) make sure the flowmeter regulator is fully opened. If not the compressor could be overheated and damaged due to the higher air consumption.

- Press exhauster pedal and wait 3 seconds minimum before opening the induction box.
- Open the induction box KEEPING YOUR FOOT PRESSING THE PEDAL till induction chamber is open.
- Transfer animal(s) from induction box to mask(s) into NightOWL.
- Turn on floodgate that stream NightOWL gas distributor.
- Turn off induction box floodgate.

Awaking / end using controls

- Turn vaporizer off (turn controller to OFF).
- Turn off oxygen flow meter.
- Move animal(s) from NightOWL to waking box.
- Turn off mask(s) exhauster.
- Check all floodgates of stainless steel beam holder and NightOWL are closed.
- Turn off compressor (wait for the engine to stop if it running), then open bleed screw.
- Turn off the oxygen bottle.
- Fill up vaporizer with anesthetic.

10.4 NightOWL II Shipping instructions

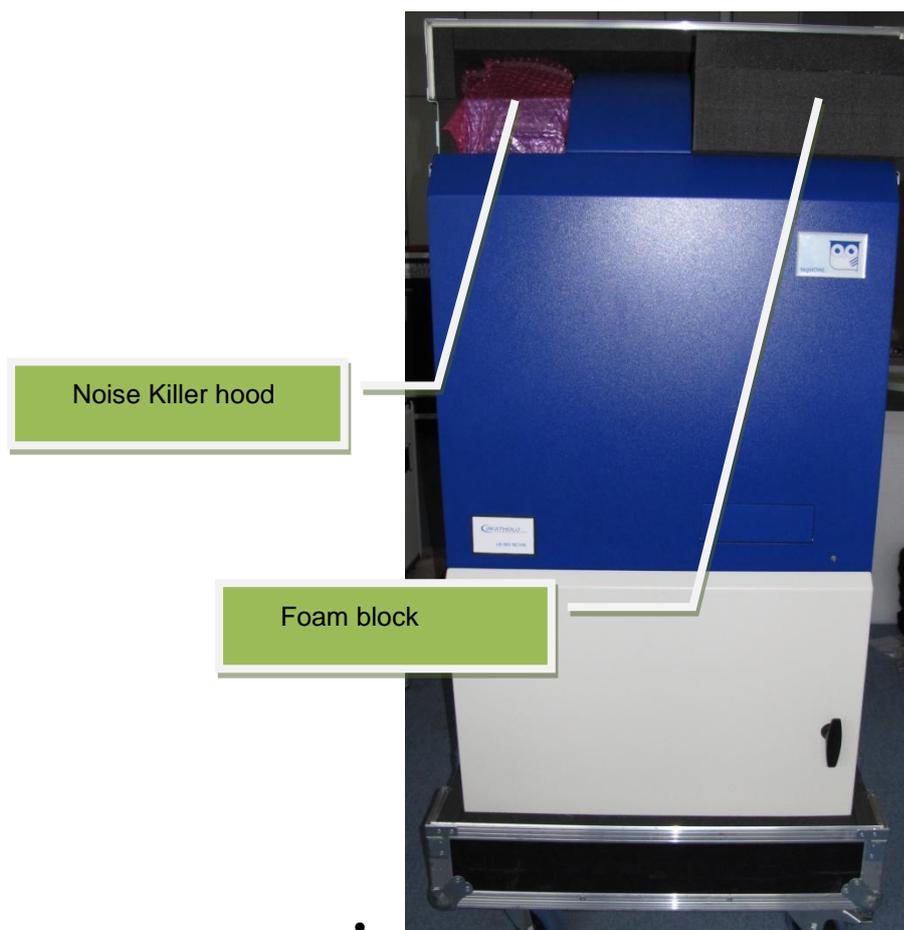
The NightOWL II must be shipped with the camera removed and the foam piece laid on the bottom plate fixed with the camera lift as shown below:



Proceed as follows:

- Remove all filters from the filter wheel (empty wheel mounted) and other accessories from the instrument and place the foam piece on the base plate as shown above.
- Move the camera (z-axis) into the transport position (step 98000 see 6.10.5) using the service software or indiGO.
- The camera drive will block the foam piece and locks the base plate.
- Switch off the NightOWL II and do not turn it on again since it will move back to the home position.
- Remove the air adapters from the camera, open the 2 thumb screws left and right of the camera, unplug the USB cable and Power supply and carefully take out the camera.
- Fix the transport holder for the air adapters as shown on **Fehler! Verweisquelle konnte nicht gefunden werden..** Use the grey spacers to avoid touching the lens.
- Clip the air adapters to the holder so that they are magnetically fixed.
- Remove the power supply cable from the instrument and place it in the camera box.
- Unscrew the noise killer at the top rear side of the NightOWL and place it in the camera box.
- Close the front door and put the NightOWL in the flight case. Close all Butterfly locks
- Make sure that the blank transport flange without gas connectors is mounted because the NightOWL will not fit into the box with gas flange. Watch the position of the flange in the flight case (recess)





10.5 Customer Reply Form

Send Customer Reply Form to:

Berthold Technologies GmbH & Co.KG
Technical Support
Calmbacher Str. 22
75323 Bad Wildbad
Germany
Phone: +49 7081 177 114
Fax: +49 7081 177 301
Email: service@berthold.com

or **your local representative.**

A blank Customer Reply Form can be found overleaf.

Customer Reply Form

Date: _____ Customer no.: _____

Name: _____

Company: _____

Department: _____

Address: _____

Address:

Phone: _____ Fax: _____

Email: _____

Instrument: _____

ID no.: _____

Serial no.: _____

Embedded software version: _____

Instrument driver software version: _____

Accessory instruments:

PC Software: _____ PC software version: _____

Windows version: _____

Computer type: _____ CPU type: _____

Other installed software:

Time when problem occurred (Windows clock):

Error message(s):

Description of the problem:

10.6 Confirmation on Decontamination

If you return an instrument to BERTHOLD TECHNOLOGIES for servicing purposes which is not properly decontaminated, there will be a health risk for BERTHOLD TECHNOLOGIES employees. We therefore need your confirmation that the instrument was decontaminated and cleaned properly before shipping. If the form below is not filled in accordingly and completely, we are forced to reject the instrument. Please understand that this is intended to protect our employees from any hazards.

Please put one copy into the shipping box and a duplicate into an envelope attached to the outside.
(please use capital letters !)

instrument / component: _____	serial no.: _____
instrument or component has come into contact with:	
<input type="checkbox"/> radioactive substances Isotope(s): _____	means of decontamination applied: _____
<input type="checkbox"/> chemical reagents specify: _____ R and S rules: _____	means of decontamination applied: _____
<input type="checkbox"/> biological material specify: _____	means of decontamination applied: _____
<input type="checkbox"/> contagious agents specify: _____	means of decontamination applied: _____
indicate security level of the laboratory the instrument has been used in <input type="checkbox"/> S1 <input type="checkbox"/> S2 <input type="checkbox"/> S3 <input type="checkbox"/> S4	
<input type="checkbox"/> I hereby confirm that the instrument or component specified above was not contaminated with any of the above mentioned substances / reagents / agents	
<input type="checkbox"/> I hereby confirm that the instrument or component specified above was decontaminated / cleansed using the appropriate method	
date: _____	signature: _____
name: _____	address: _____
title: _____	_____
phone: _____	_____
fax: _____	_____

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