

# Operating Manual

## **LB 985 NightSHADE** with indiGO Software

PC Software Version 2.0.3.2  
Firmware Version 1.08  
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**Id No.: 55393 BA2  
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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.

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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><b>Wear eye protection</b></p> <p>When using the LED panel an eye protection (DIN EN 166) is required to prevent from high intensity light caused by the LED lights.</p>
	<p><b>Caution Danger</b></p> <p>This sign indicates a general danger (e.g. switched power socket inside the instrument).</p>
	<p><b>Dangerous electrical voltage</b></p> <p>The switched power socket inside the instrument carries high voltage. Be careful when handling this device.</p>
	<p><b>Hot surface</b></p> <p>The excitation light source can become hot. Be careful when handling these device.</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.
- ☐ 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 reach into the instrument while the unit is in operation, neither with parts of your body nor with other instruments.**
- ☐ **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.
- ☐ The instrument may only be used in rooms with a max. pollution degree of 2.
- ☐ This instrument must not be used in areas with potentially explosive atmosphere.
- ☐ **The residual current protective device (RCD) must be tested before each use of the instrument.**



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 encourir 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 avertir 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 une 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.
- ☐ **Faites tester le "RCD" disjoncteur-protecteur contre le courant de défaut avant opérer votre instrument s.v.p.**



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 platziert 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.



- ☐ **Der Fehlerstrom-Schutzschalter (RCD) muß vor dem Gebrauch des Gerätes geprüft 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. Please make sure that the form is attached to 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. Please call Berthold Technologies to get the number required. 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.

Please use the following contact for your enquiries.

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](mailto: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 and forward it to your Berthold Technologies representative or to the Technical Support at Berthold Technologies, where it will receive immediate 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

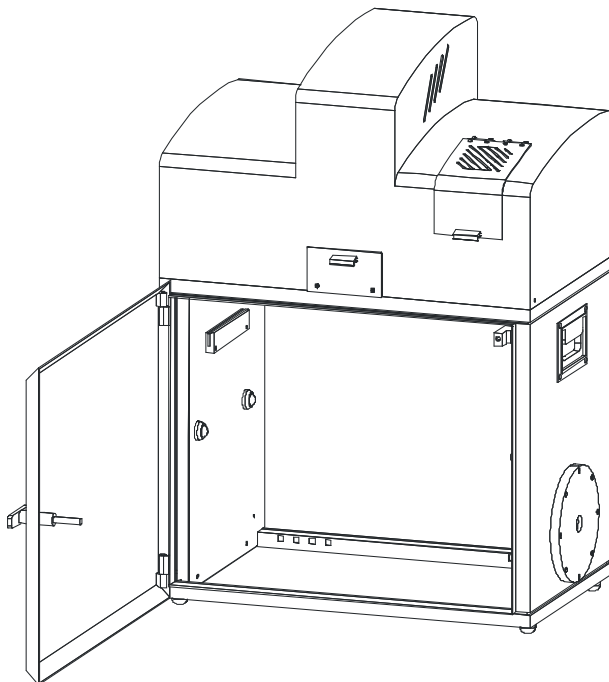


When working with UV transilluminators safety equipment (safety glass, face protecting mask) has to be worn to rule out any hazards due to ultraviolet rays. The transilluminator is designed for operating in the NightSHADE and should not be used outside the device.

### 4.1.2 Requirements

Please observe the following requirements when working with the NightSHADE:

- 2-5 mains outlets (depending on accessories). The power consumption of the NightSHADE without PC and external devices is max. 600 W.  
The power consumption of the cooling unit is 340 W.  
To power on/off the system with one switch we recommend connecting all devices to a common outlet strip.
- At least 160 cm width of workplace (the load-carrying capacity of the table or the desktop should be approx 100 kg). Make sure that the table or desktop stands firm and does not wobble.
- To use network resources (network printer, file server, etc.) a connection to a network is essential. A connection to the Internet is recommended for easier support, but it is not essential for operation of the NightSHADE.
- To allow ergonomic working, the NightSHADE 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 that the delivery is complete. If you should discover any sign of damage on the instruments or instrument parts, please notify the shipping agent and/or the distributor immediately.  
Remove the transport safety devices with care!
- Provide adequate space for setting up the instruments. To set up the NightSHADE, the computer and the printer next to each other about 2 meters are required.
- The device feet of the NightSHADE are height-adjustable to compensate a possible unevenness of the table. By turning the device feet, their height can be adjusted to ensure a safe foothold of the NightSHADE.

### 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.

**Please note: Do not turn on the NightSHADE as long as no camera has been installed.** After switch on, the device is initialized.

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. To prevent damage please remove or secure the base plate whenever you transport the device.

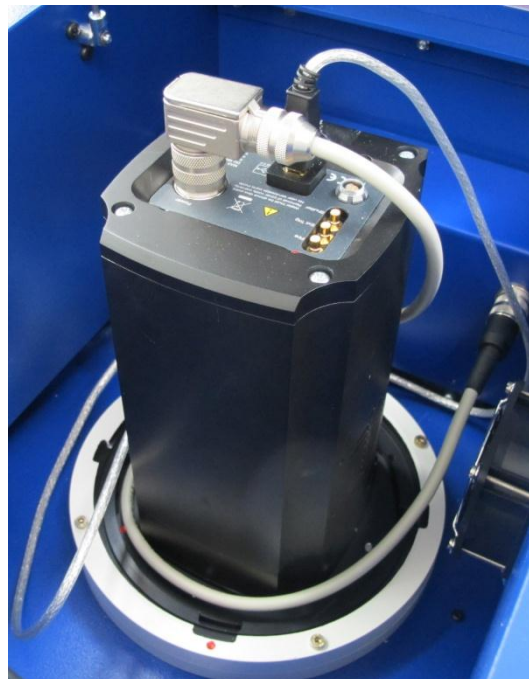
#### 4.1.4.1 Top view camera

The NightSHADE camera has a USB port to control the camera and to transfer data. In case of the Ikxx version, the camera is delivered in a separate case which also accommodates other accessories, such as the connection cable etc.

Install the camera with the "Front" label facing the front and fix it in the bayonet socket until it clicks into place. Connect the power supply cable (1) to the camera and screw it.

Make sure that the USB-connector (2) is plugged into the camera properly.

With this last step the installation of the camera is completed.



#### 4.1.4.2 Side view Camera

The NightSHADE offers the special option that the camera can be mounted on the side, too. This feature enables the system to take images of plants from the side or to measure the sample dishes in an upright standing position. The upright standing position is used when the sample changer is assembled into the NightSHADE.

The power supply and the USB connection for the camera is located at the rear side of the instrument. Please use the supplied special cables to connect the camera to the instrument.

To assemble the camera at the side proceed as follows:

- Turn off the NightSHADE.
- Open the top cover and remove the USB cable and the power supply cable from the camera.
- Remove the blind plug from the side view camera holder. To remove the cover, turn it slightly.
- Dismantle the camera by turning it counterclockwise until it can be removed
- Place the camera in the same way at the camera holder at the left side of the instrument. Make sure that the red dot at the camera is matching the red dot at the instrument bajonett.
- Plug the power supply cable to the rear panel and then to the camera.
- Plug the USB control cable to the rear panel and then to the camera.
- Put the blind plug to the top position of the camera to avoid incoming light.
- Switch on the NightSHADE.

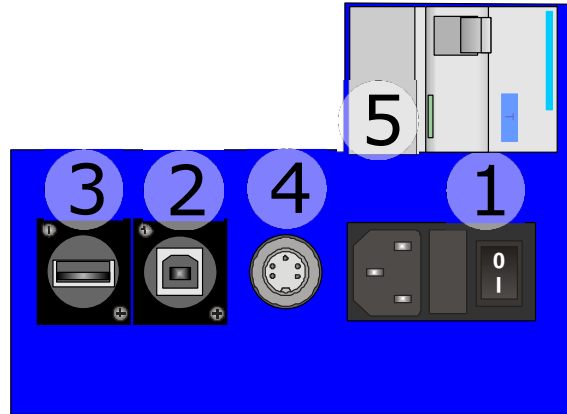


### 4.1.5 Connecting

The power supply and device communication ports are located on the rear panel of the NightSHADE. Plug the power cord into the mains inlet unit(1). The main power switch is located next to the mains inlet.

Connect the NightSHADE to the PC via the USB B-socket (2) on the rear panel using a USB cable (A to B).

The 7-pin Tuchel socket (4) is the power supply for the side mounted camera, the USB socket (3) is used for the control of the side view camera only. The residual current device (RCD) is a protection device and cuts the supply voltage in case of any leakage current (5).



**The function of the RCD must be tested before each use. Therefore press the blue button with the “T” label and check if the safety device cuts the supply voltage.**



**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.

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

The NightSHADE camera is ready for operation after it has cooled down to operating temperature; this takes approximately 10 minutes.

***The cooling of the camera is initialized when the indiGO software is started (controller startup). Switching on the NightSHADE without starting the software will not cool down the camera.***

### 4.1.6 Power On

After power on, the device starts an automatic initialization where all relevant components will be initialized. During this time, the LED on the front panel is flashing red. After the successful initialization the NightSHADE is ready for operation.

The indiGO software automatically recognizes the NightSHADE. No further steps are necessary.

### 4.1.7 Connecting to the PC

To assure the proper operation of the NightSHADE 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.

### 4.1.8 Software Installation

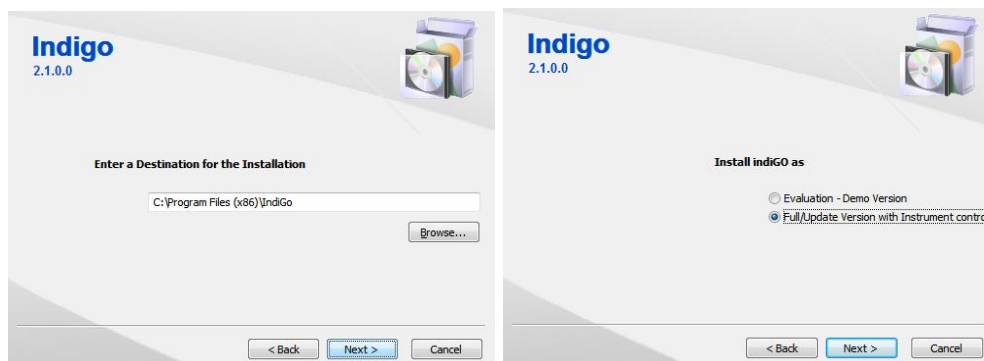
The indiGO software is included on the enclosed USB stick or CD. Use this media to install the software in order to use the correct individual calibration data which is automatically copied during installation. Keep this media in a secure place. You will need it again for program updates or new installation.

For the operation of the NightSHADE the indiGO software version 2.01 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. Click on **Next >** to get to the next page.




IndiGO can be installed in two different configurations. The evaluation or demo version will install a preconfigured system with instrument simulation to work without an instrument connected or to use it on office PCs for offline data evaluation. In this case select "Evaluation – Demo Version". The installation will start immediately.

To update an existing indiGO installation (Evaluation or full version) or new installation with full instrument control, select "Full/Update Version with Instrument control".

Depending on the hardware, a default selection of system filters might be available and can be installed through the setup. If you want to install a set of 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.

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



When working with the NightSHADE the PCI drivers are not required. Use the selections as suggested above.

**Note:** Due to the fact that the setup will install device drivers for the NightShade hardware on the 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 some 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.

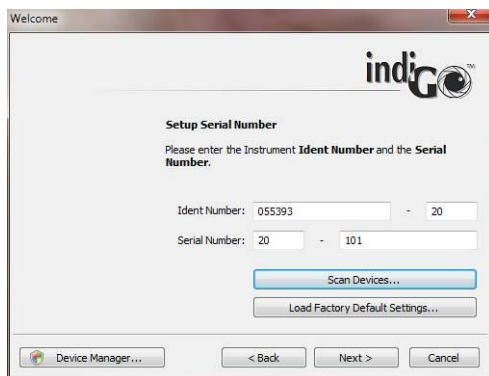


### 4.1.9 Instrument Controller First Time Initialization Setup

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.

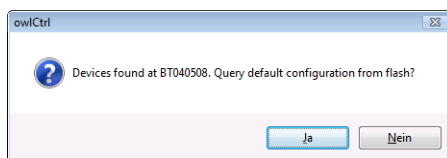


Select **Next >** to continue.



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 NightShade by Berthold Technologies before it was delivered you can download the stored calibration parameters from the instruments flash memory now by confirming „**Yes**“.



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 NightShade Controller First Time Initialization Setup allows the import of further created configuration backups and calibration files.

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.



In the next screen log on in order to verify the administrator account.

Select  to continue.



Next, choose a start method for 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 everytime indiGo is launched (if not already running). After a reboot it will not restart 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. In this case the controller is added to the startup group of Windows and starts automatically after login.

Select  to continue.



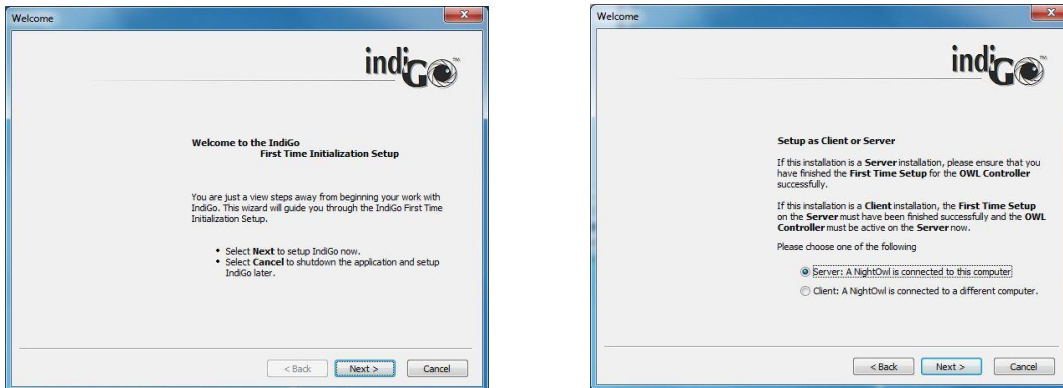
With this screen the NightShade Controller First Time Initialization Setup is completed. Select „**Finish**“, to restart and initialize the instrument controller now.

#### 4.1.10 First Time Initialization Setup

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



The first time initialization setup will start.



If the PC is directly connected to the NightSHADE via USB choose **“Server”** to install the instrument controller as well as the evaluation part.

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

Click  to continue.



If indiGO is installed for the first time the first time initialization setup will create a new and empty database.

If indiGO should be connected to an existing database, it has to be attached to this database. Use the browse command to allocate and define a suitable database

#### 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.

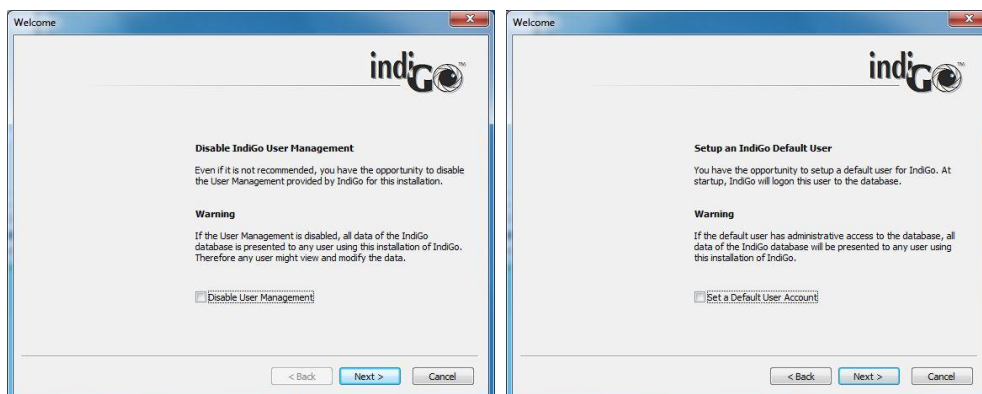
Old databases created with indiGO Version 1.x are not compatible. But data created with these indiGO versions or WinLight can be imported into the new indiGO database using the new indiGO software.

Click **Next >** to continue.



This dialog box defines the connection address to the NightSHADE controller. If the controller is running on the same computer the default settings “LOCALHOST-1024” can be applied.

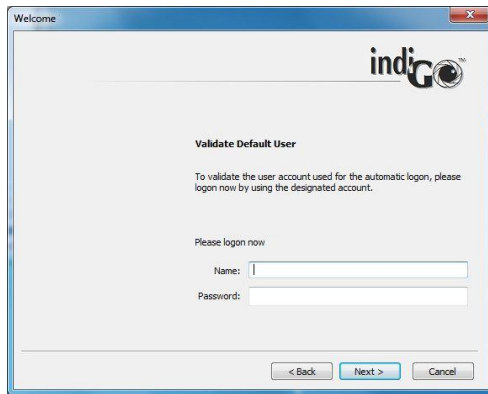
If the NightSHADE controller is running on a remote PC in the network, please set up the corresponding IP-address or the host name like “192.168.1.2-1024” or “IMAGING\_PC-1024”. The IP port number to contact the instrument controller is always 1024. Host and port number must be separated with a dash “-”.



IndiGo offers a user management. Three different modes are available:

- **<Disable User Management>** (not recommended)
- **<Set a Default User Account>**, 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. If the User Management has been disabled it can be re-activated via the system configuration at any time.



To set up an automatic log on to indiGO 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.

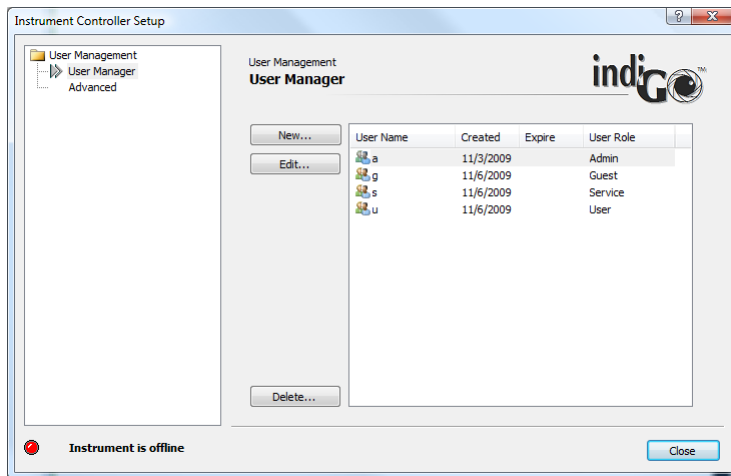
At the end of the configuration asummary page is displayed.



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

### 4.1.11 User Management

IndiGO supports an integrated user management.



The User Management can be enabled or disabled by 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 by 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 such as the system calibration is denied. The access to measurements is restricted by the user management. Other users can be invited to own projects.

#### Guest

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

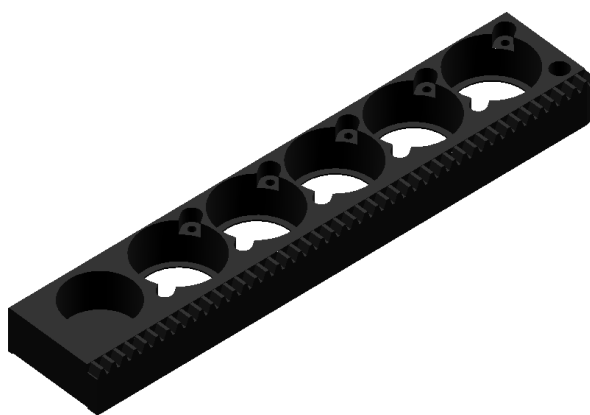
### 4.1.12 Installing Fluorescence Filters

#### Excitation Filter Slider

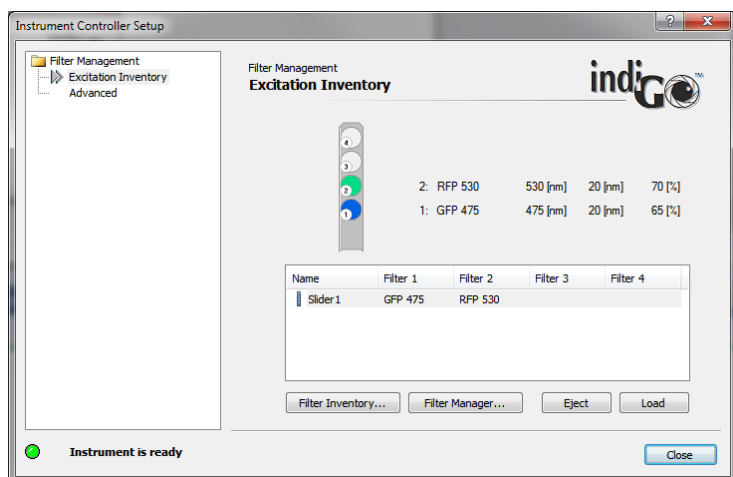
The NightSHADE IkFlu and ClaFlu are equipped with automatic filter changers for the excitation and emission path. The excitation filter is located on a filter slider, which is accessible after opening the cover on the front panel of the NightSHADE. The filter slider can hold five excitation filters with a diameter of 25 mm (1 inch). The 6<sup>th</sup> position is reserved for luminescence measurements to avoid incoming light through the fibre optic.

***This fluorescence filter option is not available with the IKLu version.***

Filters placed in the filter slider should be fixed with the snap rings provided with the device. Using excitation filters the inprinted arrow on the filter should match the arrow printed on the fluorescence filter housing. The arrow should face the sample, turning away from the light.



The filter slider can be ejected via the indiGO software (Filter Manager).



To eject the slider select **Eject**.

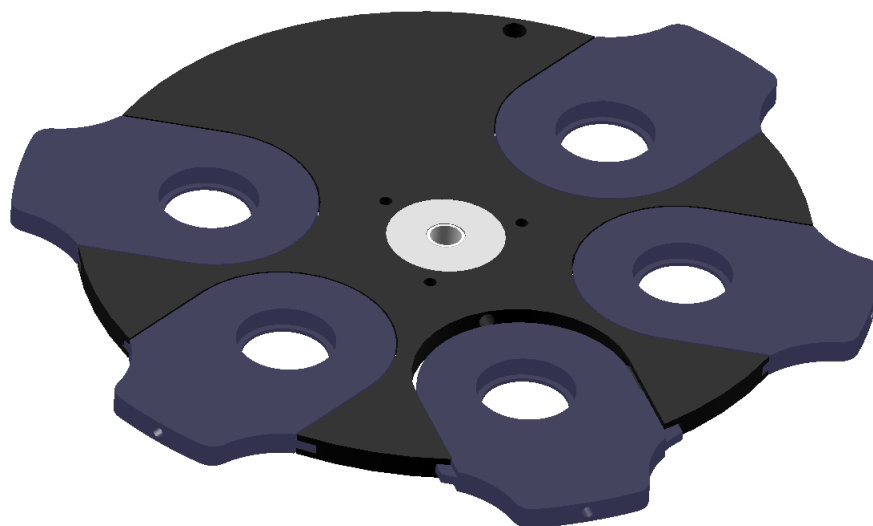
When loading the filter please observe the correct installation direction (see above) To reload the slider, select **Load**. After that the slider is initialized by the NightSHADE.



### Emission Filter Wheel

The emission filters are located on a filter wheel behind the lens. A filter wheel can hold up to five filters with a diameter up to 50 mm using specific filter holder inserts.

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



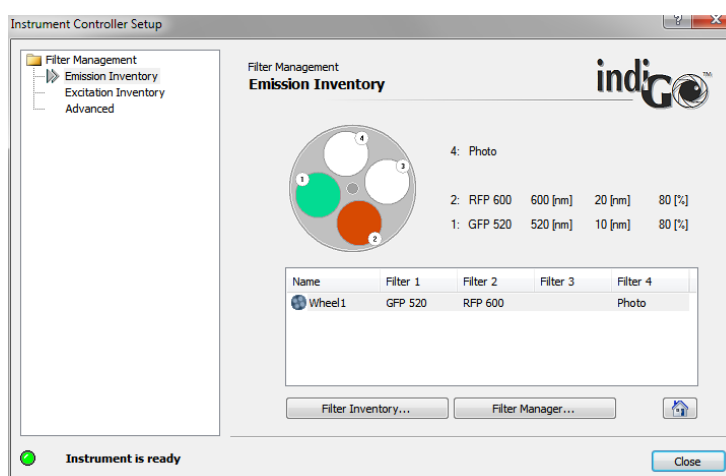
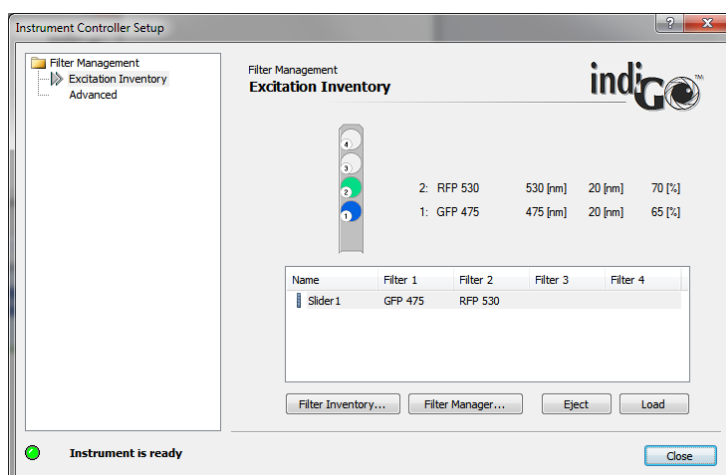
The positions of the filters are numbered and identified by a respective number printed on the filter wheel.

For luminescence and photographic measurements filter position 5 must be open. Using emission filters the inprinted arrow on the filter should face the sample, turning away from the camera.

To insert the filter slides switch off the NightSHADE, open the filter flap at the front side of the instrument, move the wheel manually to the required position and slide in the filter holder. After moving the filter wheel manually it is required to initialize the wheel again. Otherwise the filter positioning might be wrong. It is recommended to change filters on the filter wheel while the instrument is turned off.

#### 4.1.13 Filter Management

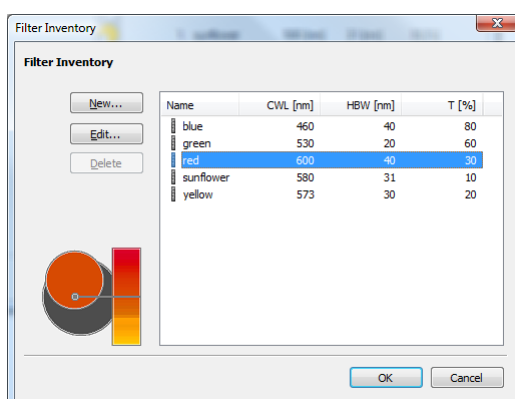
indiGO supports an integrated filter management. The filter management is used to describe the filter load on the excitation filter sliders as well as the emission filter wheels.



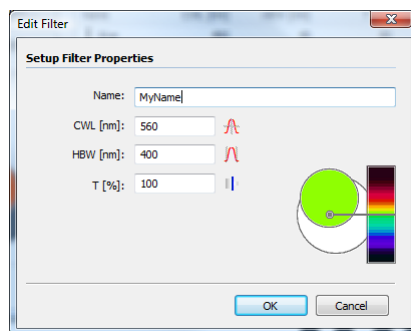
#### 4.1.14 Filter Inventory

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

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



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



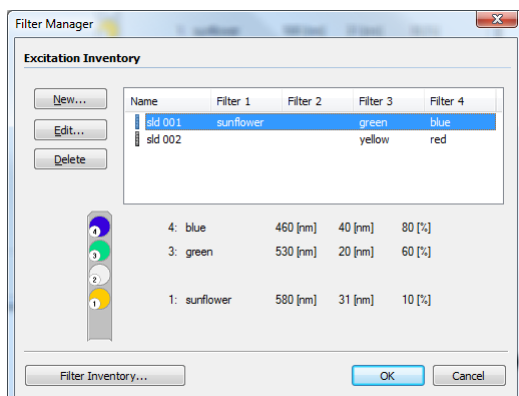
Each filter is described by the following properties:

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

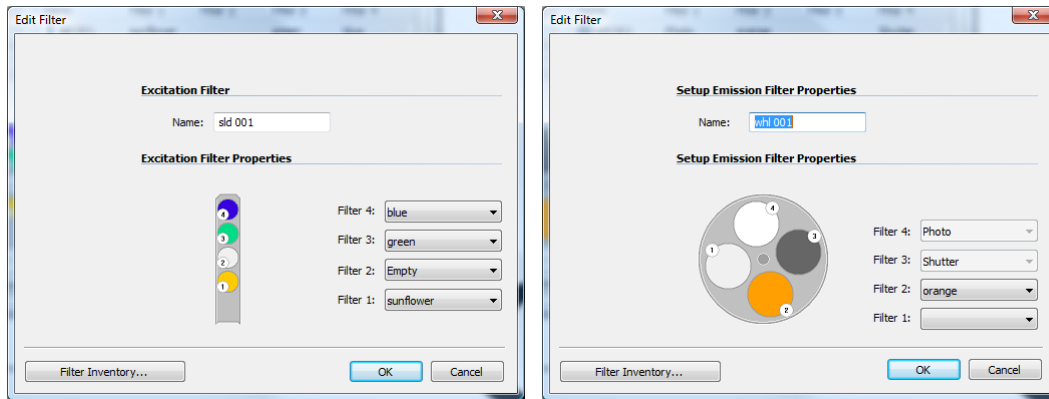
#### 4.1.15 Filter Manager

Once a filter has been added to the filter inventory list it can be used for 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 load of a slider or a wheel select **<Edit>**.



The loading can be changed using the filter dropdown list **<Filter N>**. Please keep in mind, that only available and unused filters are displayed in the droplist. Before you can assign a new filter to a position, either a new filter has to be added to the **<Filter Inventory>** or an existing filter has to be removed from its position.

#### 4.1.16 Filter Manager – Backup and Restore

All data from the filter manager can be exported from the system and stored to an 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 samples, called identities, can be organized in a project. Each project is connected with an application.

To perform a measurement, select an identity and the system automatically refers all settings of the project and the correlated application.

After the measurement is accomplished all data will be automatically transferred to the pre-selected identity of the project.

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

#### **Example:**

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

#### **Projects and Applications**

Applications consist of a pre-measurement, a measurement and a post-measurement.

When a project is created a mirror copy of the used application is saved with that project. This means that changing the original application template later on will not affect the project's parameters. Consequently changing parameter settings in the project (e.g. exposure time) has no influence on the original application template.

On the other hand before each measurement the application settings of a project can be modified. The last modification is always saved with the project. Settings used for each specific measurement performed can be found in the report.

#### **Projects and Users**

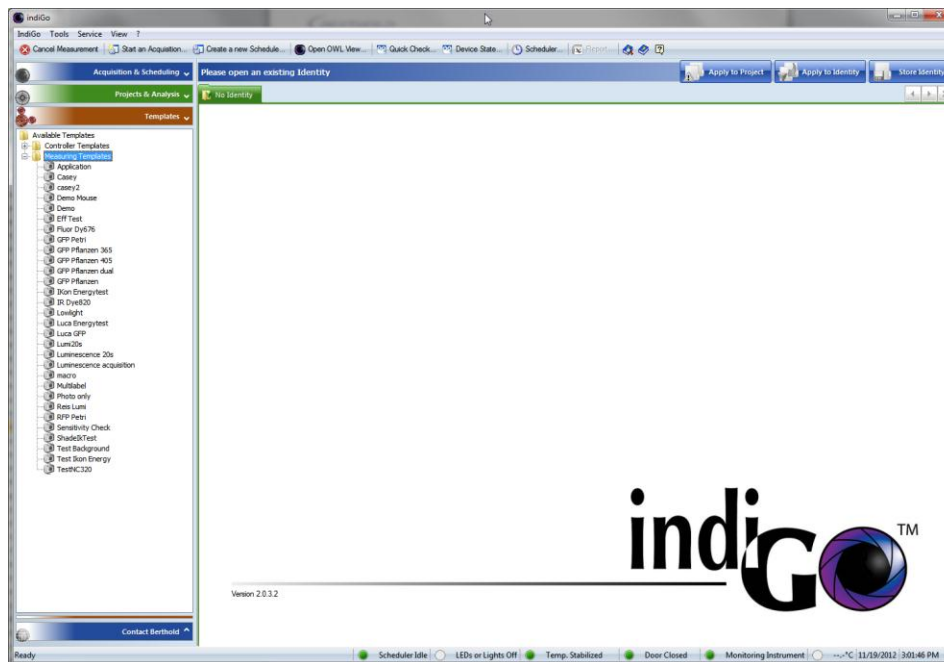
Projects can be associated to users. When created, a project belongs to a specified owner. The owner has the possibility to allow other users to access the project and to run measurements on identities associated with the project. To allow other users the access to a project, the owner has to create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

## 4.2.2 Launching the software

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

**Log-in:** Admin  
**Password:** Admin

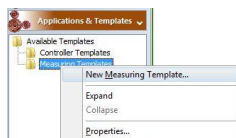
After log-in the main window of indiGO is shown:



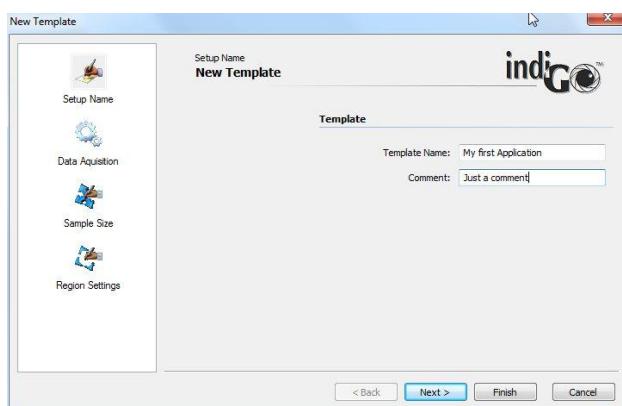
## 4.2.3 Defining a Measuring Template

indiGO defines different measurement methods (e.g. luminescence measurement, fluorescence measurement) by an measuring template. In each template the measurement mode, the exposure time, the measurement sequence and the filter settings, (if available), are assigned. Administrator access rights are necessary, to set up a measuring template. If this is not guaranteed the function to define a measuring template is not available to rule out faulty operations.

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



First enter a name after indiGO has started the wizard. In addition a descriptive comment can be added. Due to Windows file and path name conventions special characters such as < > ? " : | \ / \* . are not allowed.

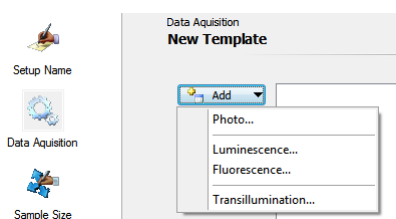


Select **Next >** to define the measurement workflow.

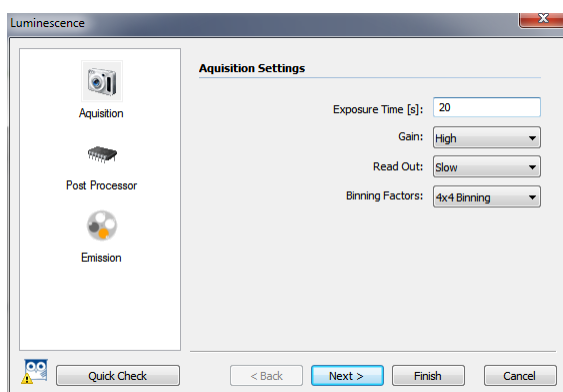
Four different kinds of measurements can be performed. Please note that depending on the system configuration some of the selections might not be available (e.g. due to a missing fluorescence illumination module).

Example:

To define a luminescence measurement, select “luminescence” from the dropdown list after clicking on **Add**



The Luminescence image wizard will pop up.



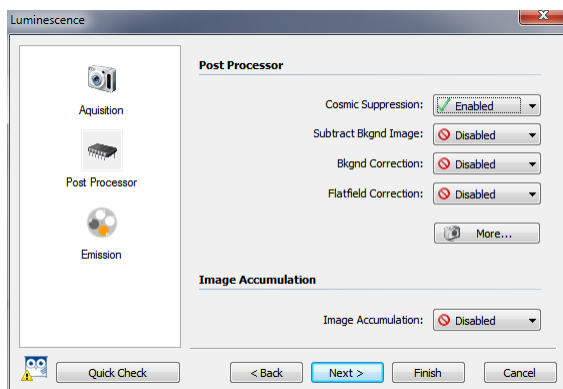
- **Exposure Time**  
is the length of the time the CCD chip is exposed to the sample
- **Gain**  
is an internal conversion factor. Low Gain offers high dynamic range while high gain gives higher intensity numbers but limited dynamic range. When using the NC100 camera the difference in signal between low and high gain is about factor 4.
- **Read out**  
defines the speed to read out the camera. High speed is recommended for photographic images and high intensity measurements such as fluorescence since a higher back-

ground noise will be obtained. Low speed is ideal for highest sensitivity luminescence measurements. Be aware that with low speed the camera readout can take up to 15 seconds.

- **Binning Factor**

is the combined readout of neighbouring CCD pixels. 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.

Select **Next >** to get to the post processing definition.



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.

- **Subtract background image**

This function will subtract an individual background image from the taken image. The mode "Pre Image" or "Post Image" defines if the background image will be taken before or after the real image using the same settings. While taking the background image, the camera shutter is closed. The image background subtraction eliminates camera background pattern or memory images.

- **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 an uneven image caused by the vignetting of the lens

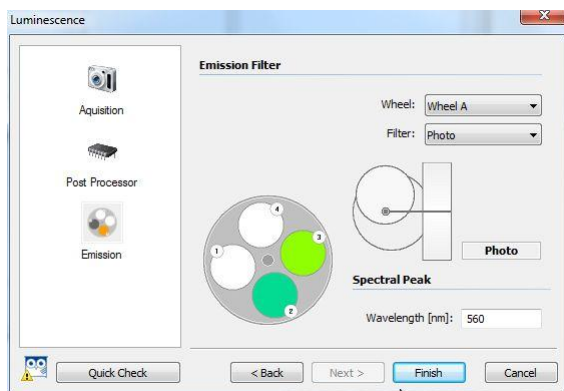
- **Image Accumulation**

With activated image accumulation more than one image is taken and added on top of the previous one. This allows a smoother background and offers a better cosmic suppression (if enabled). Up to 9 images can be added.

Enable the cosmic suppression to avoid spots caused by cosmic rays during longer exposures. Clicking on the **More...** button will open the parameter box to adjust the image processing filters. For save cosmic suppression use about 50% strength. Increasing this value will increase the risk that real small spots will be treated as cosmics.

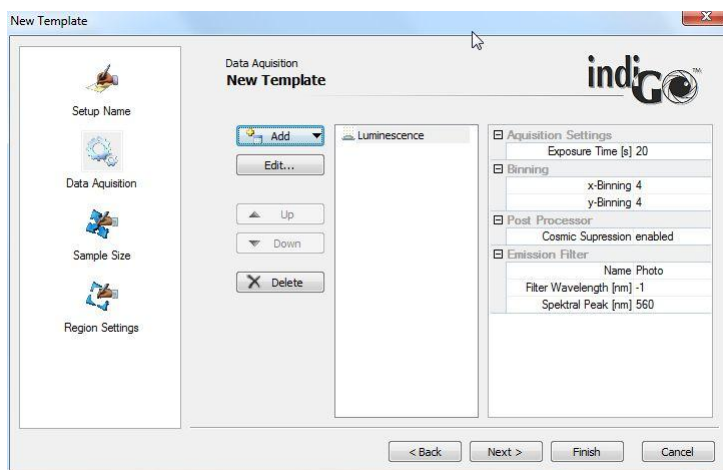
Since luminescence is measured no filter is necessary. That requires the selection of the empty / photo position in the emission filter settings. To ensure a proper energy calibration check the wavelength mentioned in the input box (560nm for firefly luciferase).



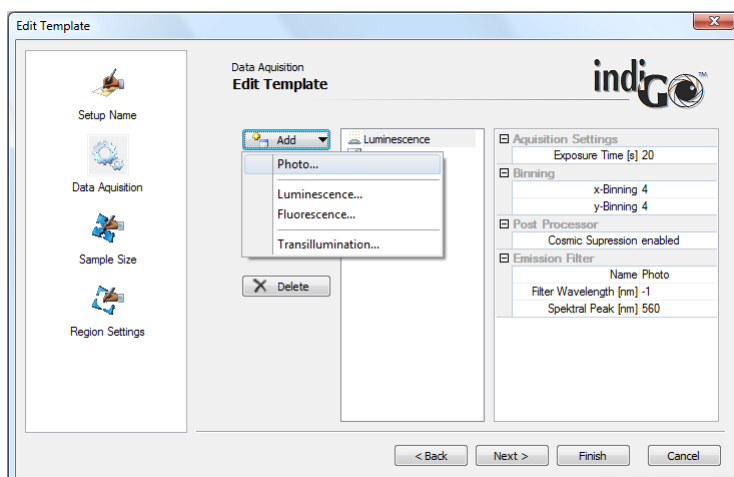


To close the luminescence parameter wizard select **Finish**.

The summary of the new created luminescence measurement is shown in the right column:

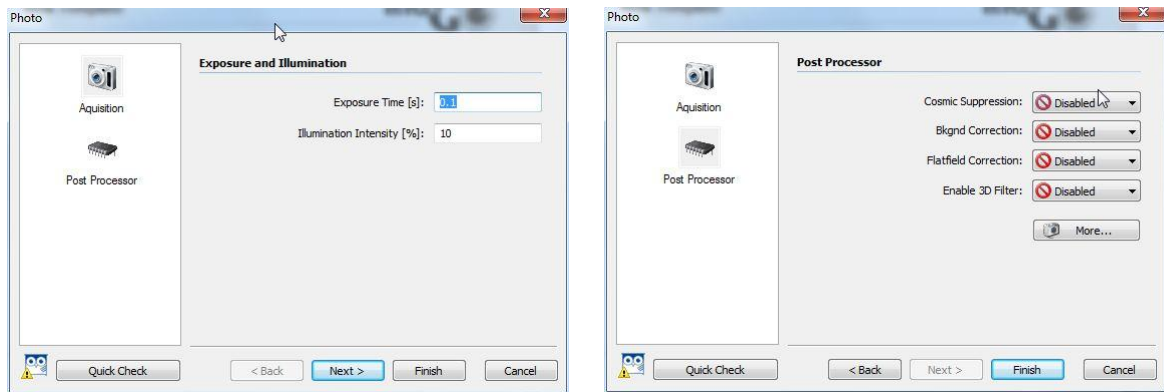


To add a photographic exposure to the list of measurements select **<Add>**, **<Photo>**.

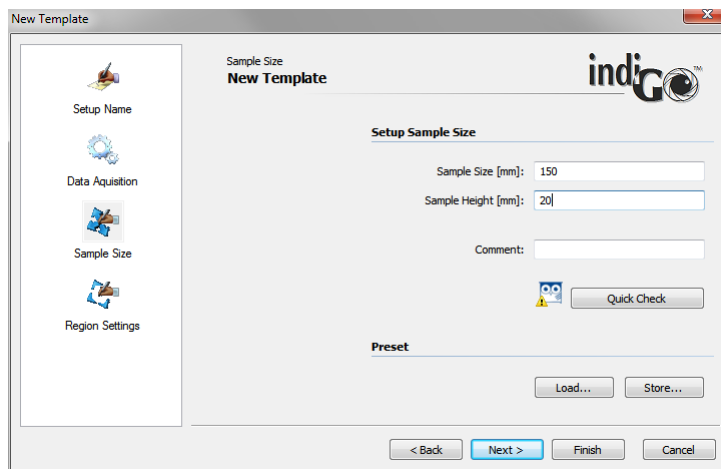


The default parameters (100ms exposure time, 10% illumination intensity) are suitable for most applications. Disable all post processors in the corresponding section. The “close iris” feature improves image quality (depth of focus). This feature is not available with in the NightSHADE

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



For the sample size definition dialog box select **Next >**.



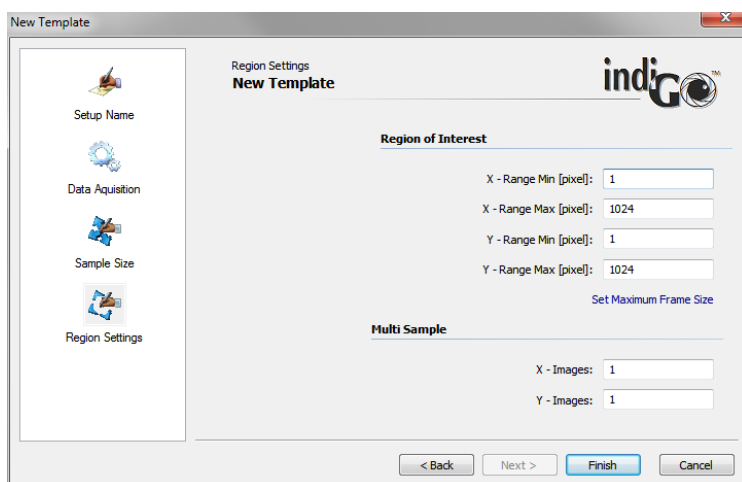
You can either select an already existing format using the load button or define a new sample format. The following parameters are required:

- 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 (hier ist bei der Shade doch egal, was man einträgt, sollen wir das nicht ändern?)
- 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 either check the focus or whether the entered sample size is adequate for the acquisition of the sample.

If the focus is not OK it can be adjusted by manually adjusting the focus ring at the lens.

To go to the next page select .



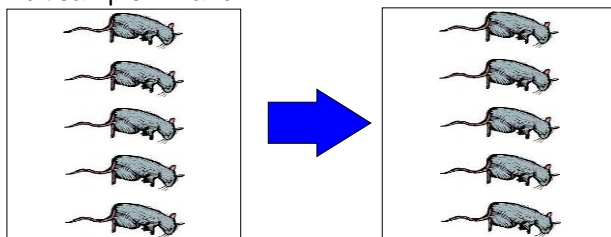
On this page you can define the setting for the “Region of Interest” as well as the “Multi Sample” parameters.

By using the “Region of Interest” a section of the CCD chip can be defined to get faster frame-rates. By default the whole chip area from 1 to 1024 for X and Y is used

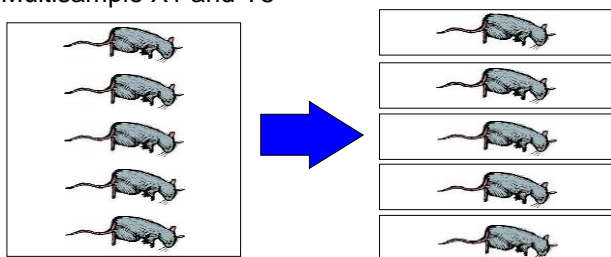
The command “Set maximum Frame Size” will adjust the frame size according to the selected binning factor since some cameras cannot handle full frame at different binning factors.

The MultiSample feature allows the possibility to split the image into image 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).

Multisample X1 and Y1



Multisample X1 and Y5



In case of multi sample the required identities will be defined before starting a measurement.

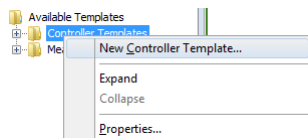
To close the application wizard select .

#### 4.2.4 Defining a Controller Template

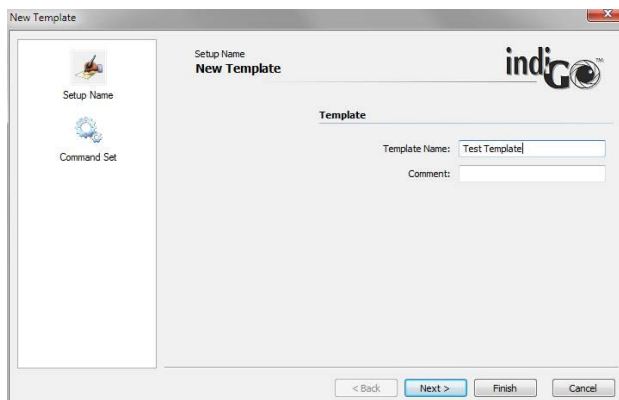
When creating a controller template the workflow is about the same as with a measuring template. . But instead of defining measurement settings controller templates are used to control additional devices such as the LED panels in order to simulate environmental parameters (e.g. day & night cycle). Furthermore control templates are used to define pre- and postmeasurement settings such as “Daylight off and on” which allow to interrupt the light simulation and go back to its original setting after the measurement.

A controller template consist of a list of single commands. This list will be splitted in its single commands when executed using the so called scheduler. Therefore it is possible to perform measurements inbetween

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

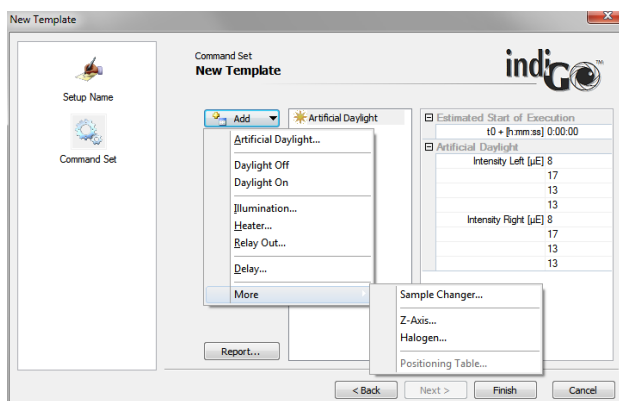


indiGO starts the wizard. In the first window the controller template can be named and a descriptive comment be added

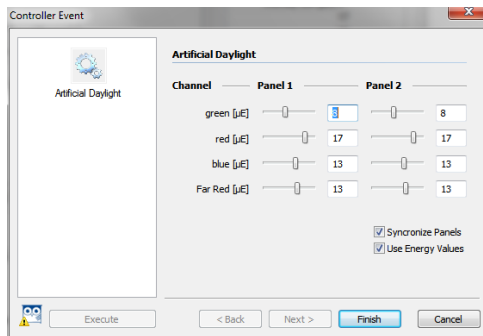


Select **Next >** to define the control workflow.

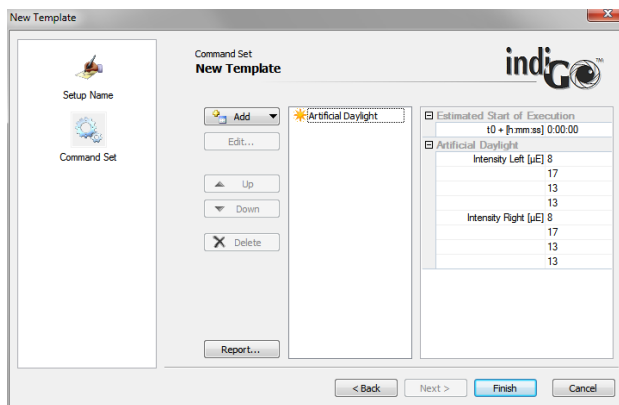
Different kinds of control actions can be performed. Please note that depending on the system configuration some of the selections might not be available (e.g. due to a missing LED illumination).



To turn on the LED illumination (Option) select **<Artificial Daylight>** from the list. Now the intensities of the different wavelength can be adjusted

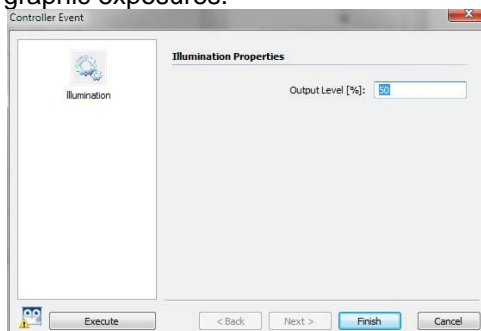


Adjust the required intensities and click on **Finish** to accept the parameters. The control command shows up in the work flow list.



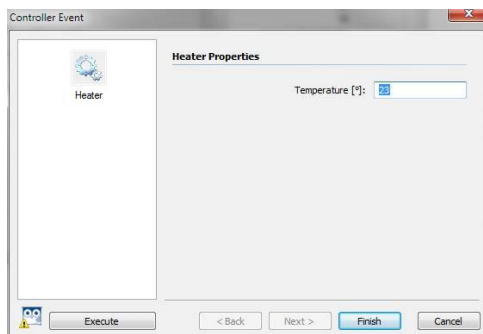
After setting all commands, close the dialog box and save the template by clicking on **Finish**.

- **Daylight Intensity (option)**  
This command sets the LED illumination panel to a defined intensity. The used intensities are temporarily saved for future use.
- **Daylight Off (option)**  
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 (option)**  
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 (option) LEDs in the dark room for photographic exposures.



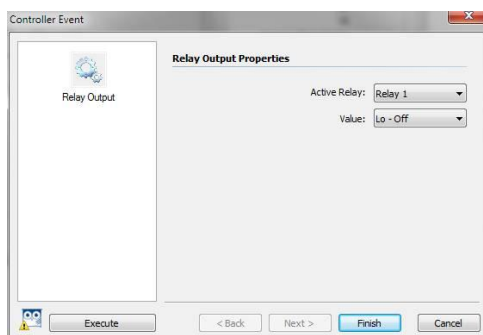
- **Heater**

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



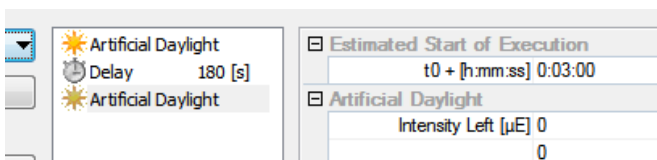
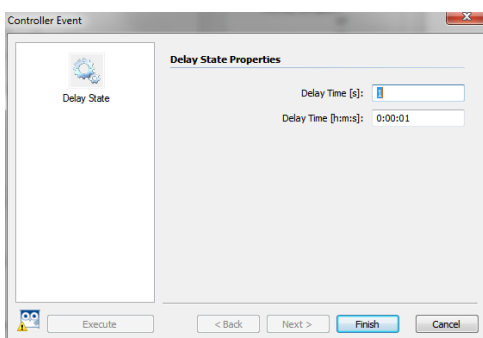
- **Relay Out**

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



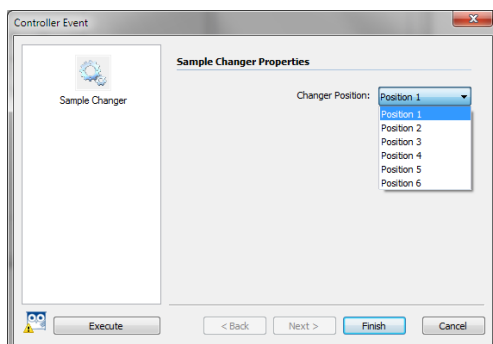
- **Delay**

Defines a waiting time within the control sequence. When inserting a delay command the relative time of the control sequence ( t0) will increase. The delay time can be inserted either in seconds or in h:m:s format (hour : minute :second).



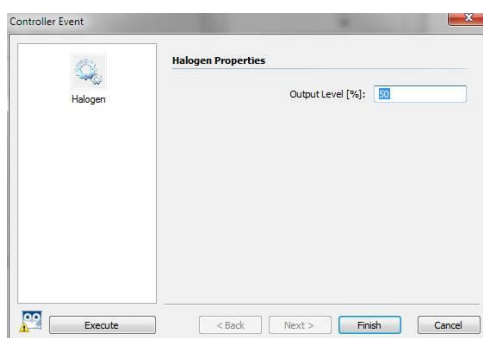
- **Sample Changer (option)**

Moves the sample changer to a defined position.



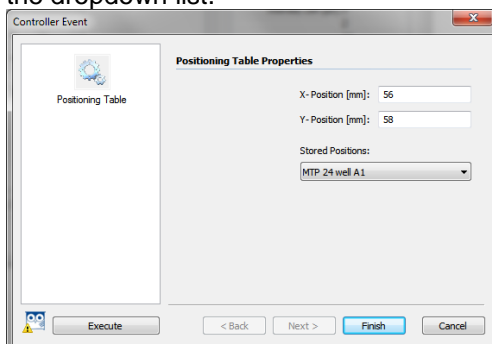
- **Halogen (option)**

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



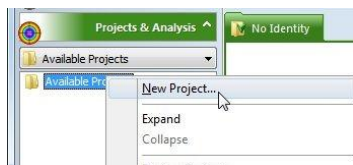
- **Positioning Plate (option)**

The positioning plate is an optional table to move the sample in X and Y direction. The required position can be entered in mm or a predefined position can be selected from the dropdown list.



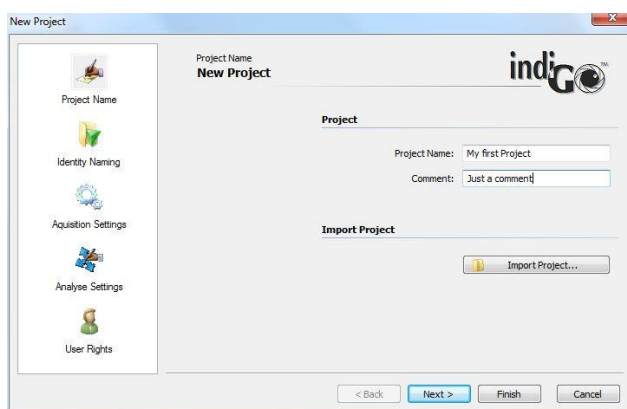
### 4.2.5 Defining a Project

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.

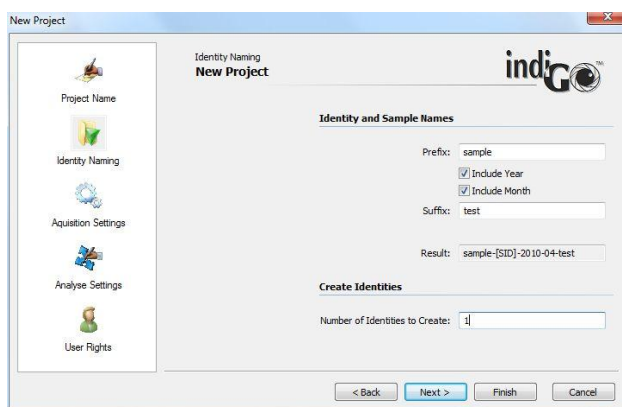
To create a new project indiGO starts the wizard:



The following parameters are necessary:

- **Project Name:**  
Enter the project name under which the project is to be saved. Due to 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 >**.



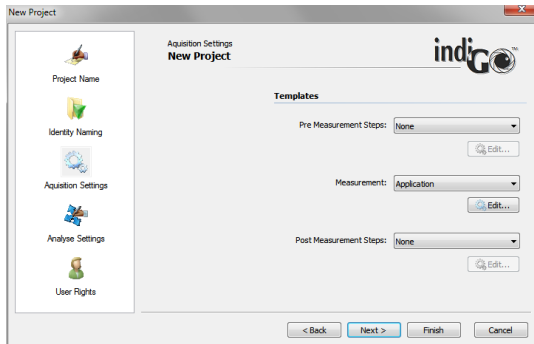
In this page the number of sample identities and the sample names can be defined.



A prefix, the current year and month, a 3 digit sample ID counter and 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.

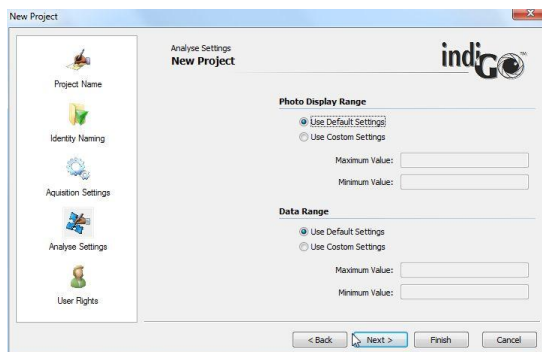
To go to the next page select [Next >](#).

Choose the **“Acquisition Settings”** used for the project.



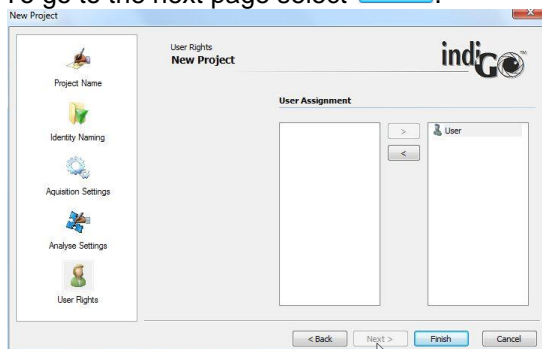
a **“Pre Measurement”** and a **“Post Measurement”** can be defined to be executed before and after the measurement. Under **“Measurement”** select the measuring template needed.

To go to the next page select [Next >](#).





The display ranges for the b/w photographic and colored signal (data) image are 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 [Next >](#).



On the last page users can be assigned to the project. The projects creator automatically receives ownership of 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  .

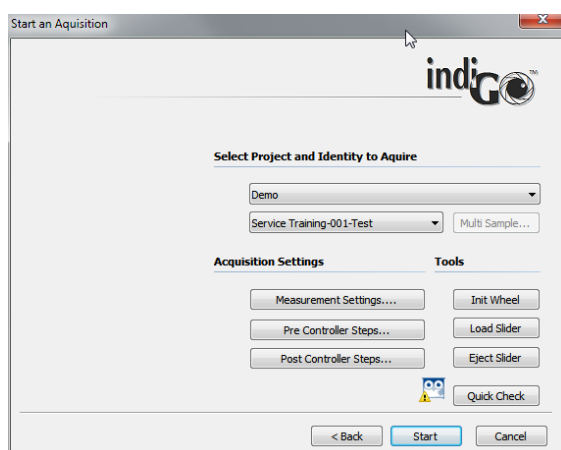
## 4.2.6 Starting an Acquisition

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

First we will show here how to create an 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>**.

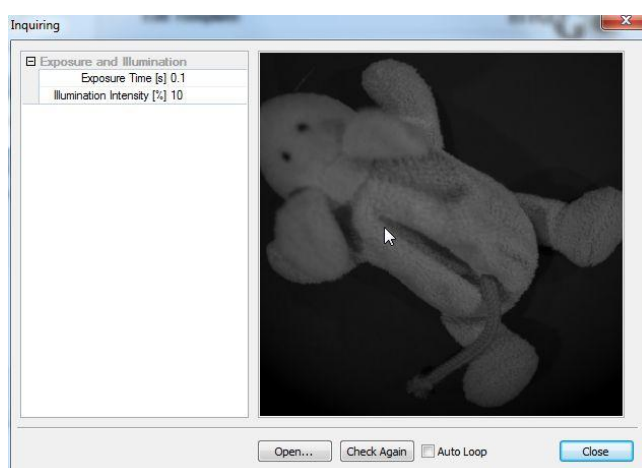
The acquisition wizard will be shown:



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

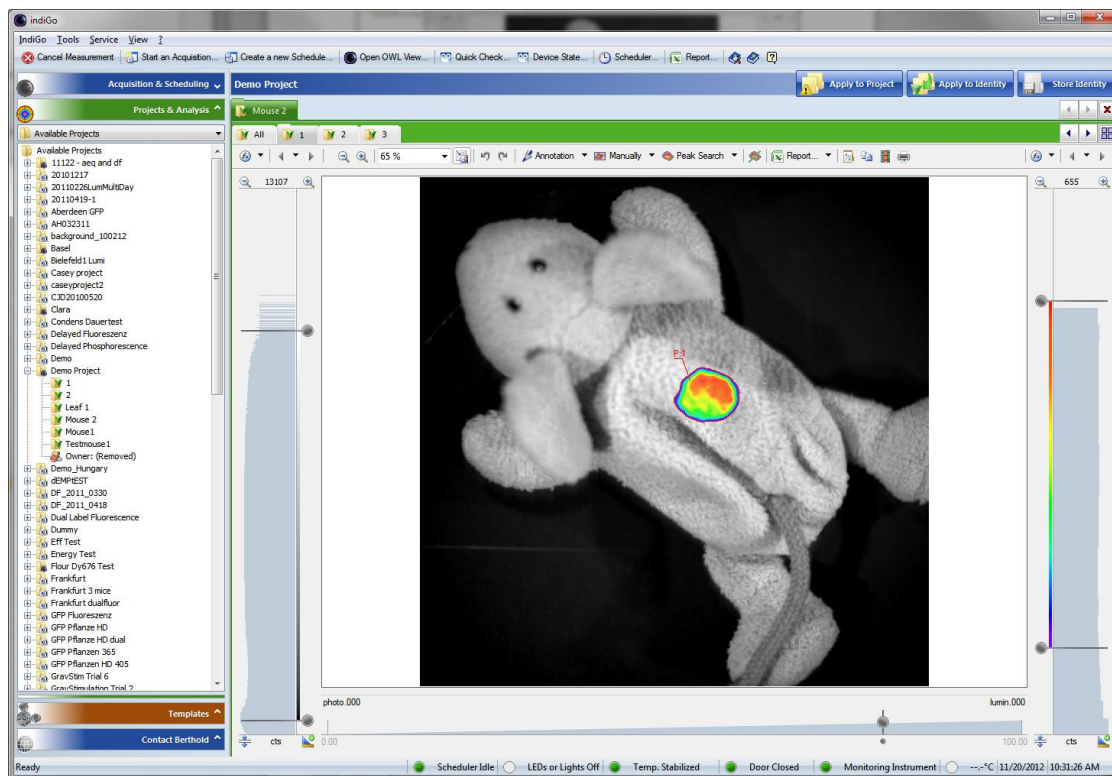
By selecting **Quick Check** a photographic preview of the sample is created using the project settings

This preview might look as follows.



If the “Auto Loop” checkbox is activated the camera will take an image continuously. This might be useful for sample positioning or when adjusting the focus at the lens.

To start a measurement select **Start**. Upon completion of the measurement, the data is automatically stored. The data is displayed by double clicking on the sampleID.



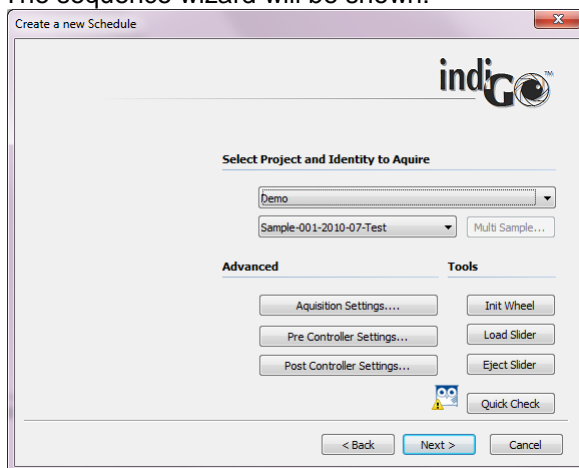
The measurement consists of a photographic image in grayscales and the luminescence image in pseudo color.

## 4.2.7 Image Sequences

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

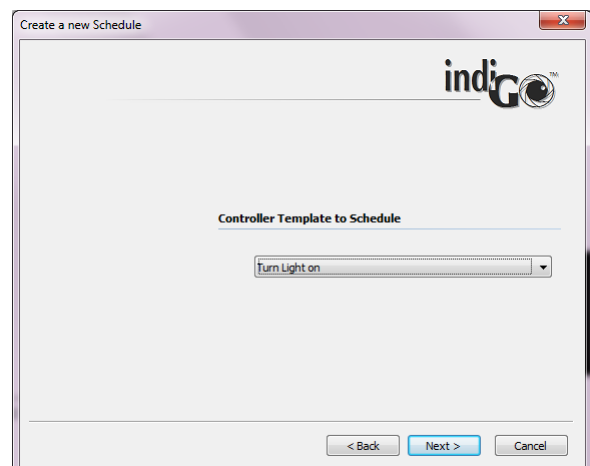
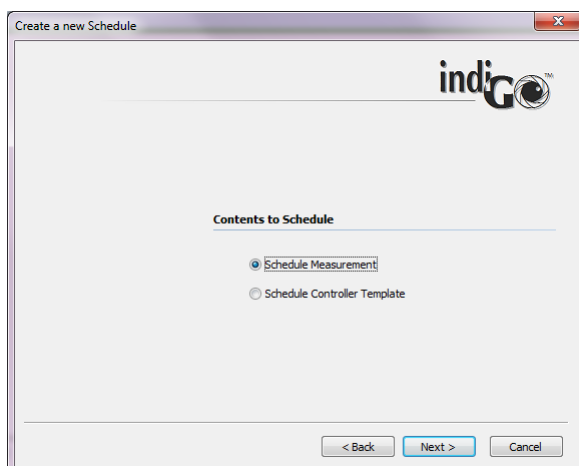
To start a sequence measurement refer to **<Acquisition & Scheduling>**, **<Create a new Schedule>**.

The sequence wizard will be shown:

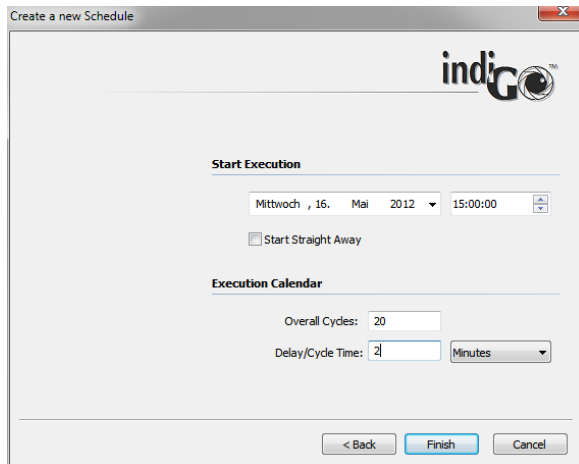


First of all specify the type of scheduled event. To set up a scheduler for measurements choose "Schedule Measurement", to set up an schedule for controll actions (lights on, mains switch, etc.) choose "Schedule Controller Template".

If choosing the measurement mode, first a project and sample ID has to be selected. In case of the controller template mode, the corresponding controller template has to be selected from the list.



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

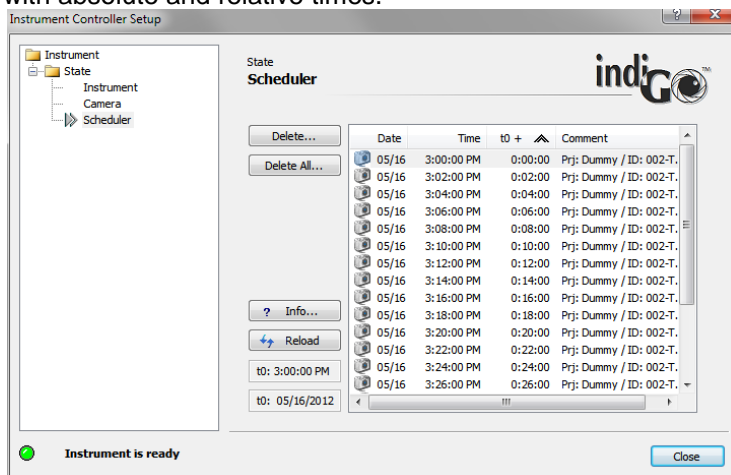


In this dialog box the starting time for the measurement- or control sequence can be defined. Alternatively “Start right away” can be selected by checking the box. This will enable an immediate start when **Finish** is clicked. All other events will be relative to this starting time.

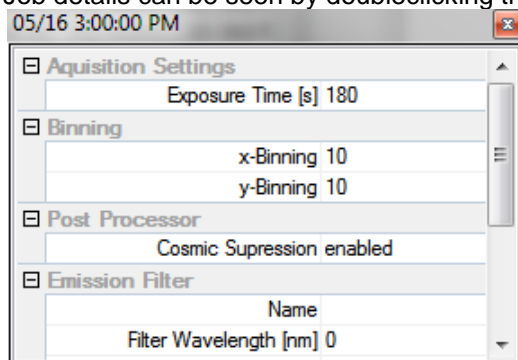
In the “Execution calendar” the total number of measurements / sequences as well as the interval time can be specified. Clicking on **Finish** will close the sequence wizard and the sequence is handed over to the scheduler.

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 with absolute and relative times.



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

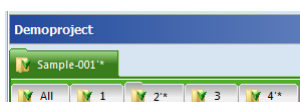
During the first acquisition images have been created and stored in the project folder.

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 double-clicking 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 card-file tab for each identity is displayed, each cardfile tab has its own color.



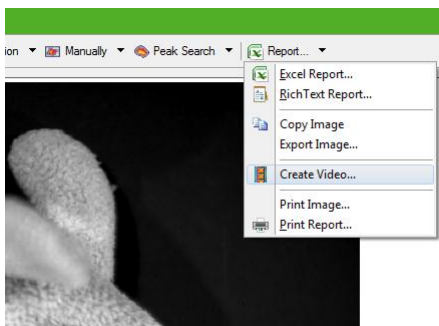
Below the identity number a row of index cards is shown containing the measurements acquired. The last acquired measurement is shown on the very right.

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 .

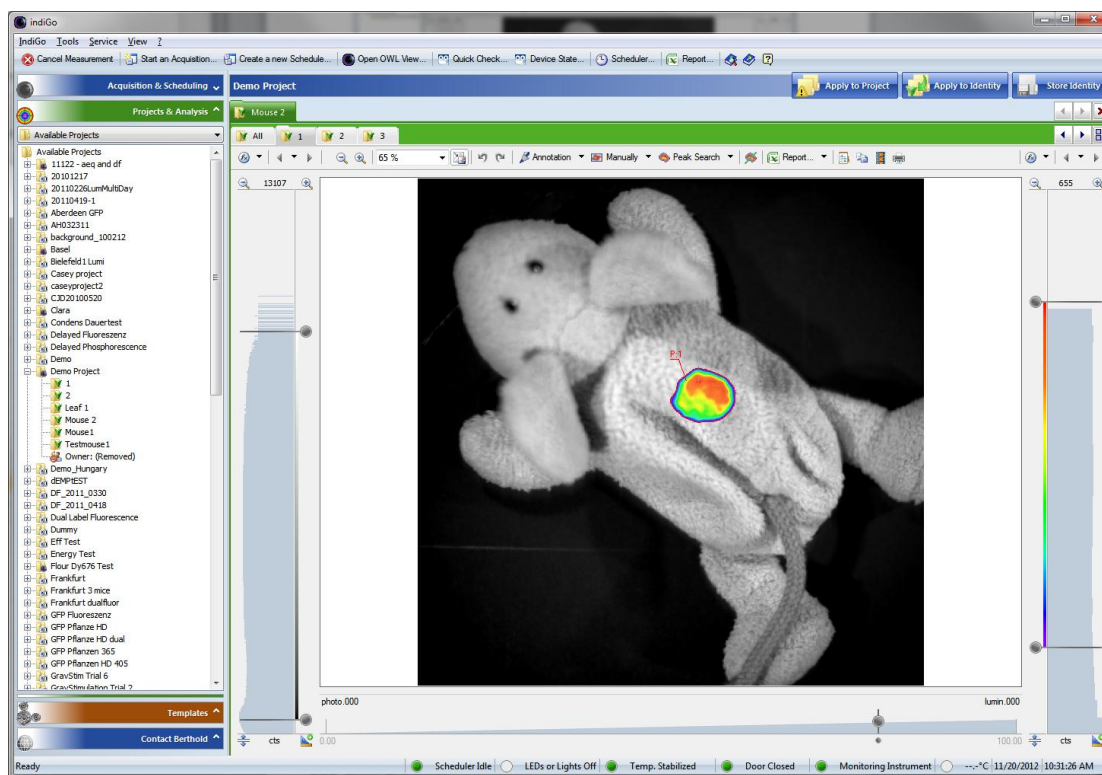
To close the identity select .

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



### 4.3.2 Image Window

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.

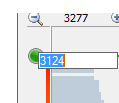


At the left margin of the screen you see the intensity scale and histogram of the photographic image, together with the associated sliders. These sliders can be used to change the brightness intensity of the photographic image. The top slider defines the upper brightness value, whereas the bottom slider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

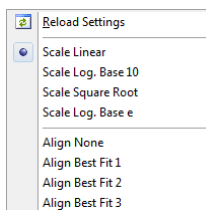
To modify the scale move the slider to the position required. Moving the mouse to the center of both sliders a center mark is displayed which enables you to move both sliders at once.


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





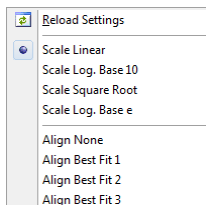
The system offers the possibility to zoom the histogram by using  3277 . The maximum range of the histogram is displayed on the zoom toolbar. By selecting **<xxx>** the histogram can be set to fullscale. With **<xxx>** the displayed unit can be changed from cts to %, nW or ph/s.



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

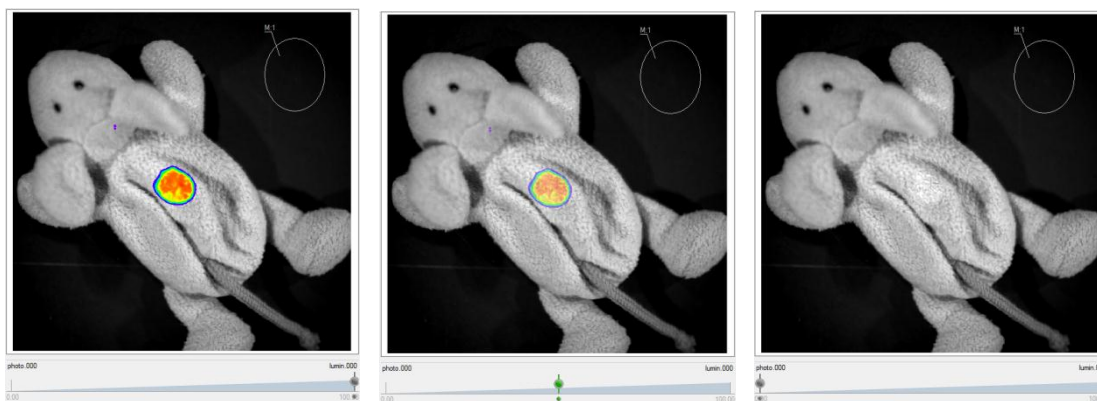
The following options for the scaling are available:


- 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.

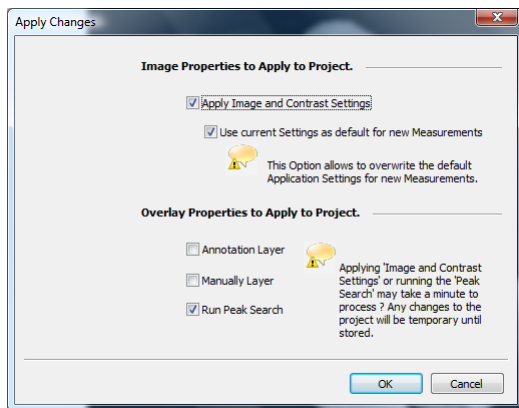
At the bottom margin of the screen a transparency slider is available. This slider can be used to define the transparency of the overlay. If the slider is in the 100% position, the overlay is completely opaque, whereas the overlay is fully invisible if the slider is set to the 0%.



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 .

This opens all data of the current project (Apply to project) and applies the changes. To get back just close the data without saving.

**Please note:**

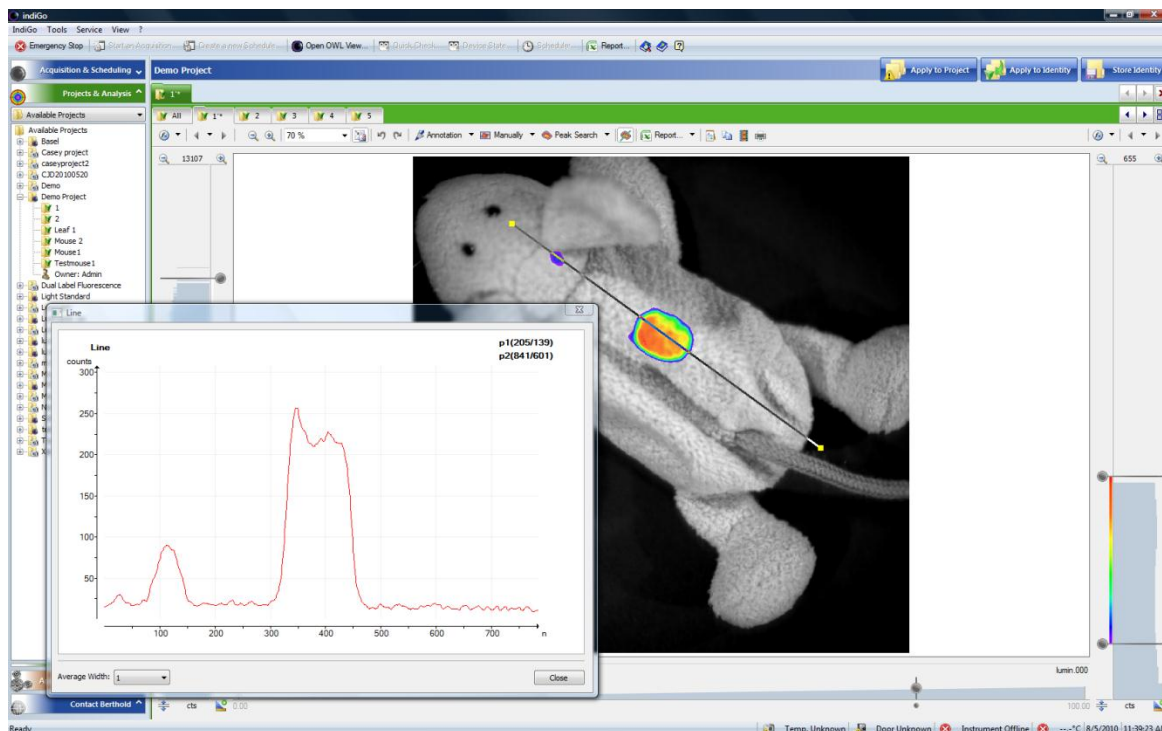
Depending on the selections and the amount of data this function may take some time to accomplish.

### 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 .

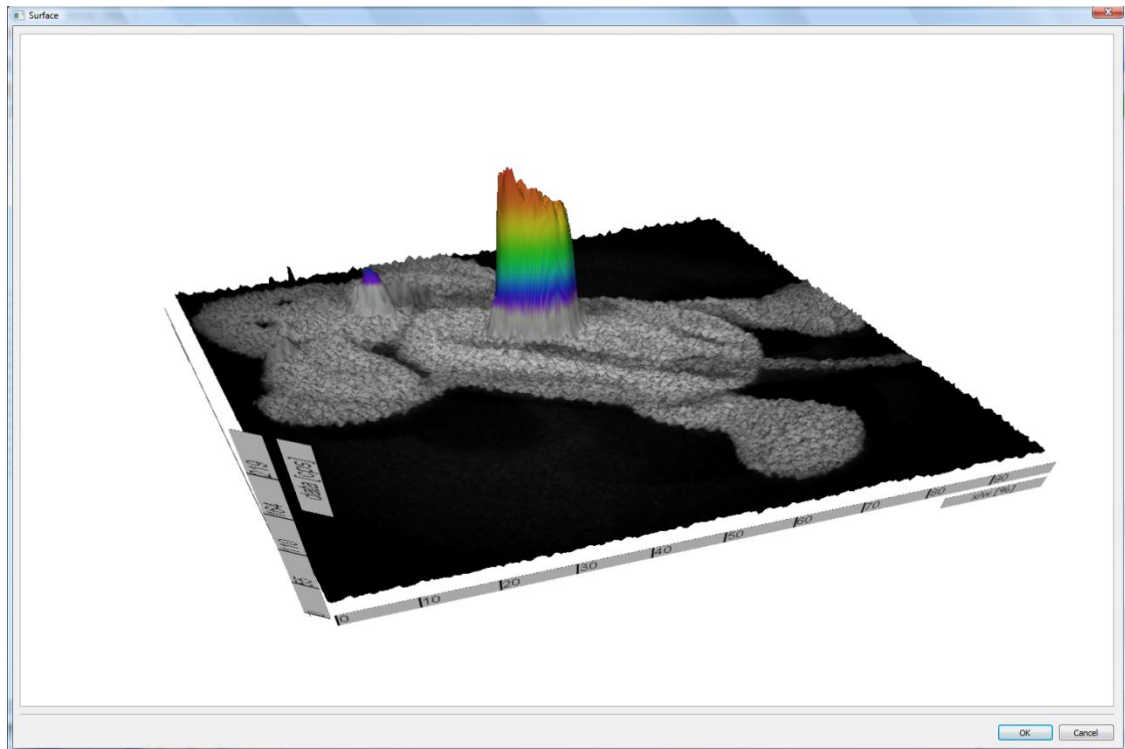
An additional window is opened where the line profile created from a given lead is displayed.




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.

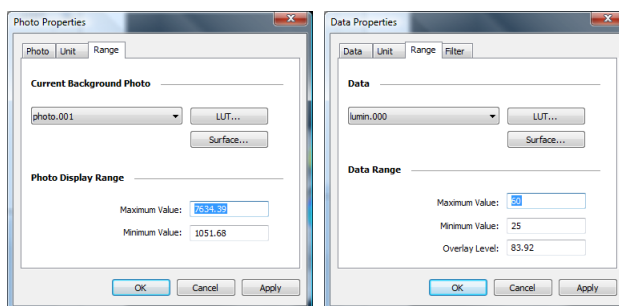
#### 4.3.4 Surface Plot

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 zoom in use the mouse wheel.

To animate the surface double-click on the graph.

**Please note:**

The windows displaying the surface can be resized.

### 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.

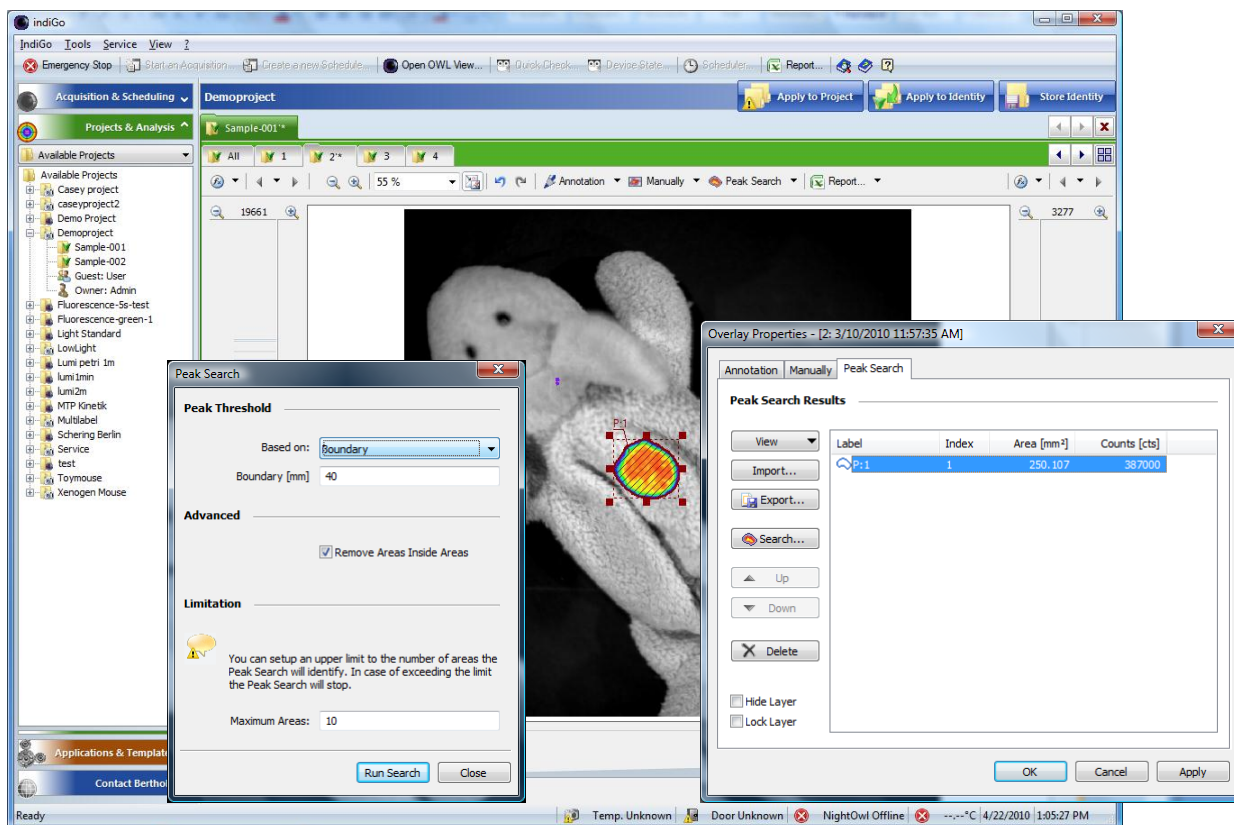
In the first step the desired areas has to be marked; now indiGO can calculate the intensity values.

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  Peak Search.

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



To run a new search select  Search...


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 a 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 .

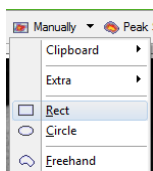
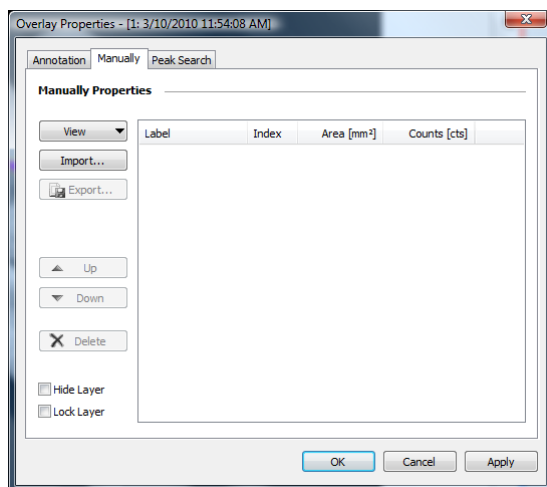
### 4.3.6 Define Areas Manually

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.



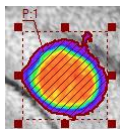
If you want to create new areas open the context menu by using the arrow on the button **<Manually>** and select the required shape (rectangle, circle or freehand shape) from the context menu.

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

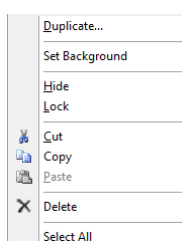
To define a freehand shape circle the desired area with several clicks on the left mouse button or hold it down completely (pencil mode). A double-click will end the procedure.

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. When pressing **<CTRL>** and **<Shift>** while moving the selected area this area will be duplicated. The copy mode is indicated with a little “+” next to the mouse cursor symbol. To select more than one area just press the **<CTRL>** key while selecting the area with a mouse click or drawing a box around the required areas.



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.

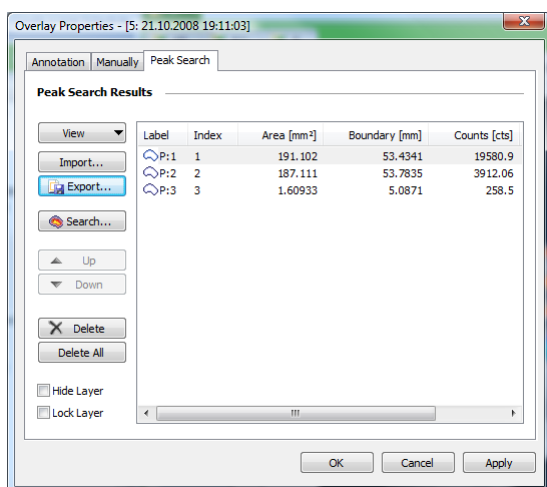
To create a copy of the current area select **<Duplicate>**.

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>**.

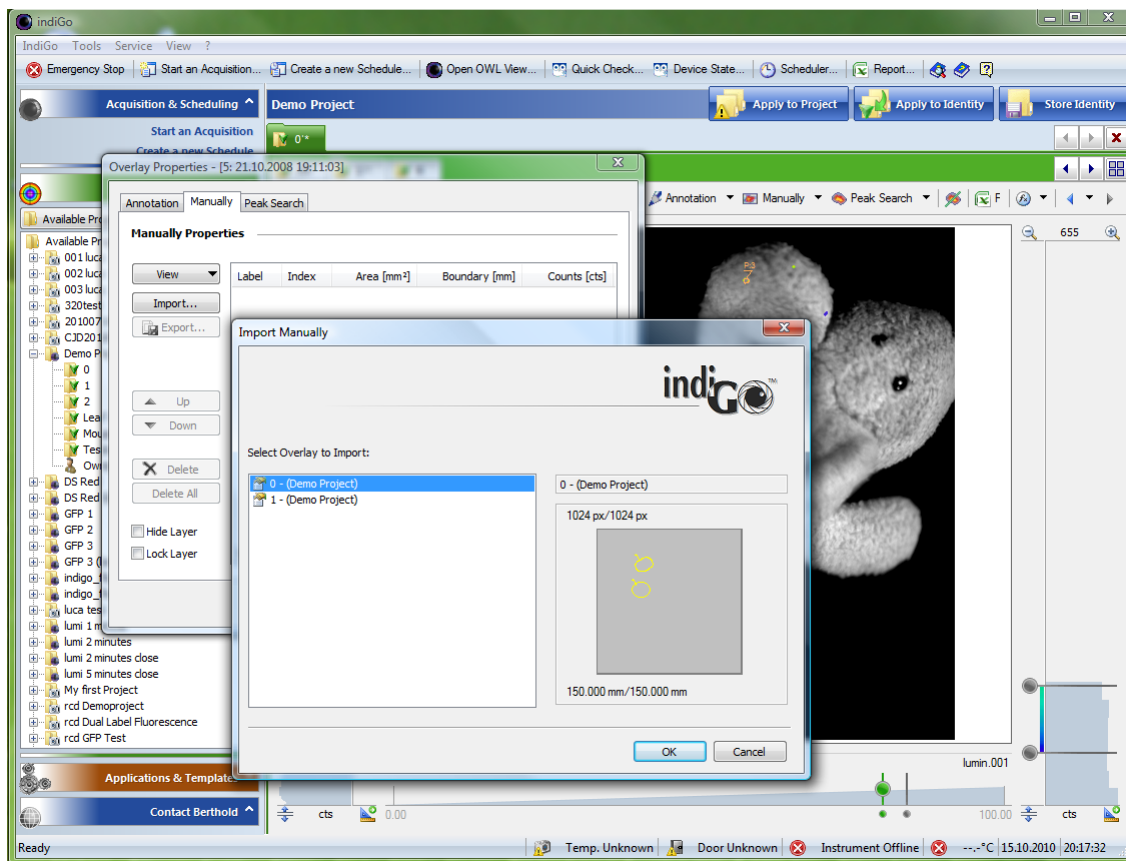


Further commands for the area management are available via the context menu of the area items list.



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.



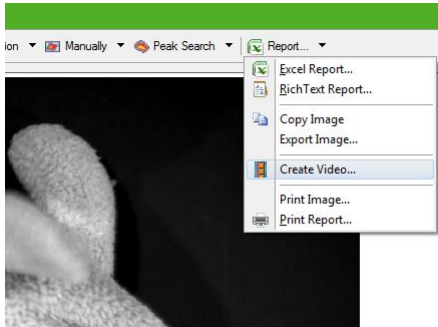


## 4.4 Creating a Report

### 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. The meta data of each image will be displayed next to each image.

- **Units Area & Elongating**

Different units for the areas and the elongatings can be selected. Millimeter and centimeter can be selected for geometrical values (e.G. area or size of an area).

- **Measured Data**

Different units for the measured data can be selected.

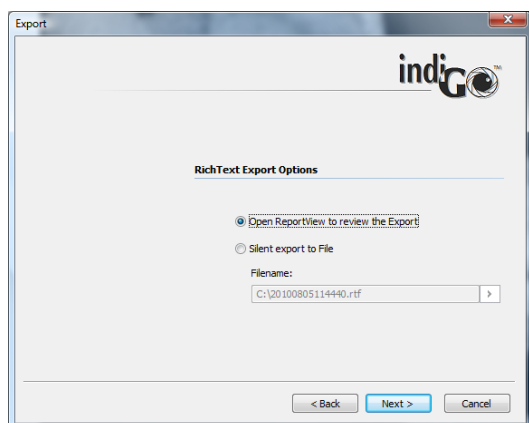
The intensity data can be displayed in counts (raw values), the emitted photons (ph/s) or the emitted power (nW). The photons as well as the power values are based on a calibration using a light

standard. This calibration is only valid, when the sample is placed on the base plate and not higher than 50mm. In case of a different sample size height or position, the calibration is not valid and wrong results will be calculated using the default calibration. In this case a dedicated calibration must be performed using the light standard.

This calibration can be applied to luminescence measurements only.

- **Rich Text Export Options**

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

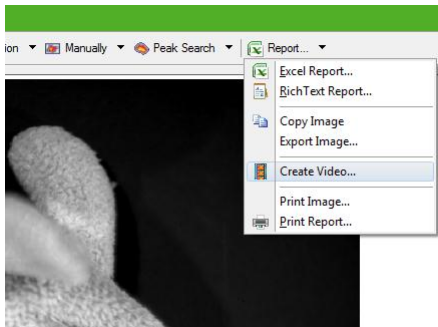


#### 4.4.2 Excel Export

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.

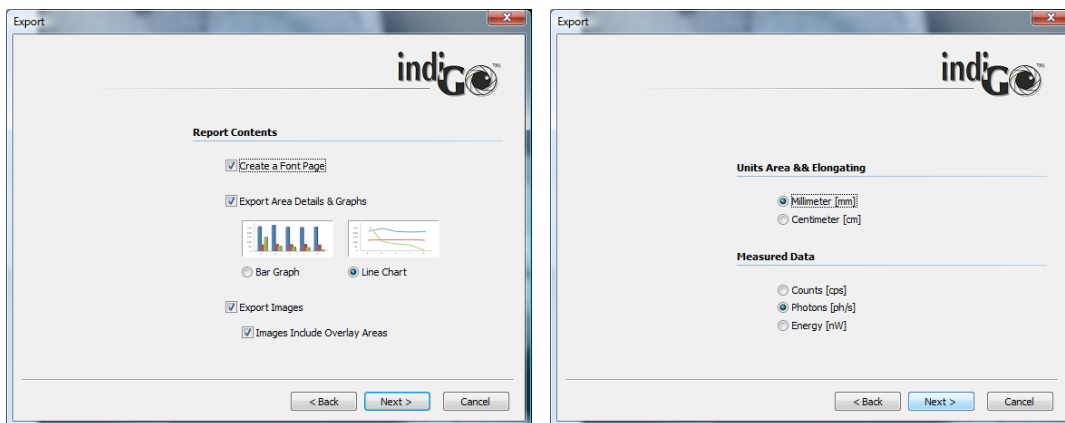
Using the **<Excel Report>** command in the **<Report>** menu will start the Excel-Report-Creation-Wizard.



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

- **Create a Front Page**

With this command you can 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**

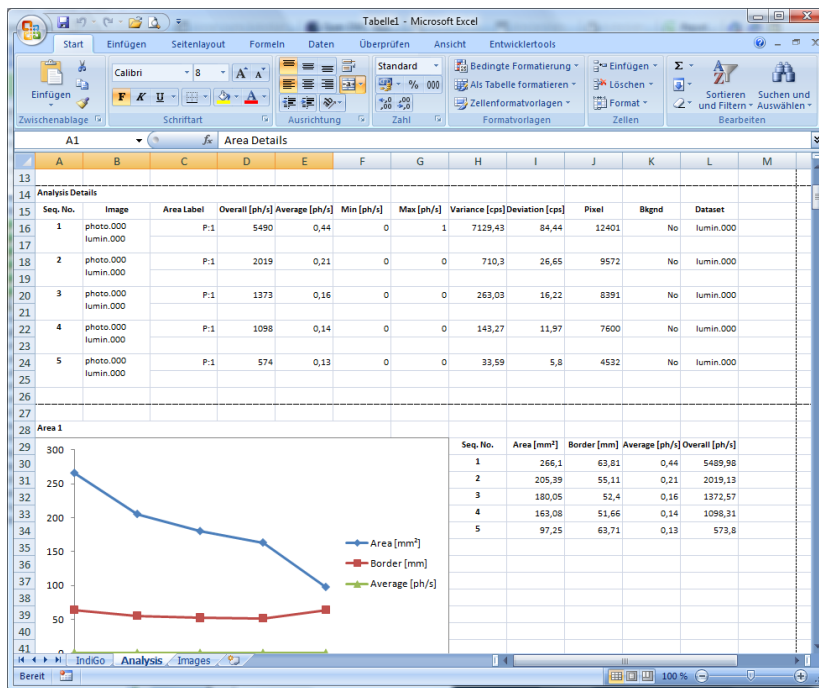
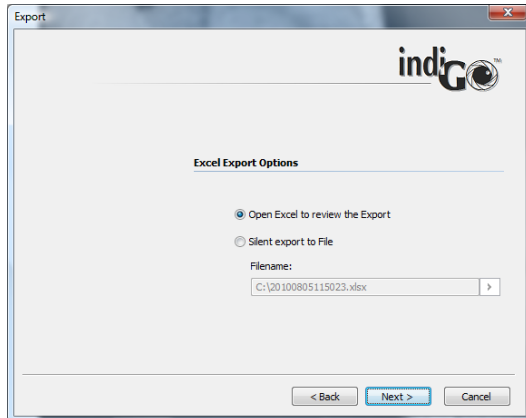
Different units for the areas and the elongatings can be selected.

- **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.

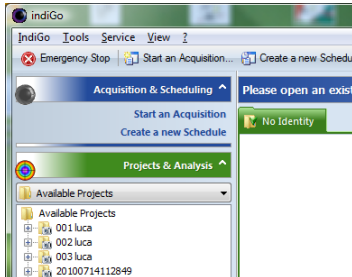
- **Images**

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.

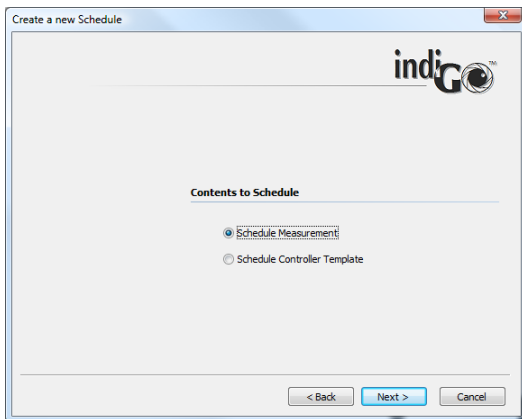
## 4.5 Using the Scheduler

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.

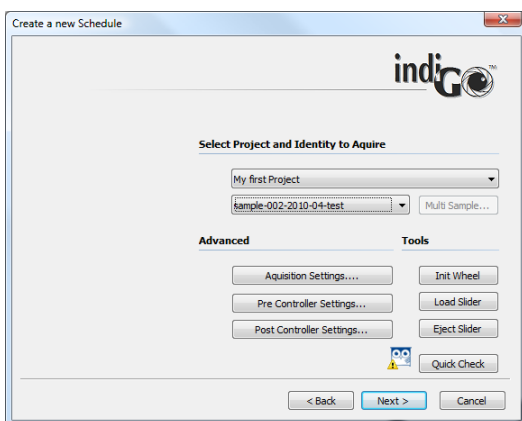
To start an acquisition, refer to **<Acquisition & Scheduling> <Create a new Schedule>**.



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.

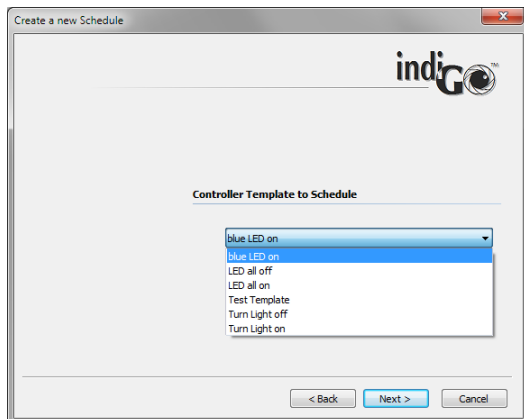


On the next page you can select the project and the identity you want to measure.

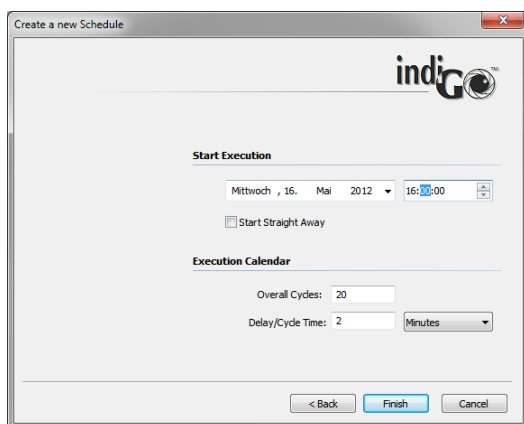
Using the **<Advanced>** or **<Tools>** commands you can validate the acquisition, pre- and post-controller settings or initiate a **<Quick Check>** to create a test image.

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.

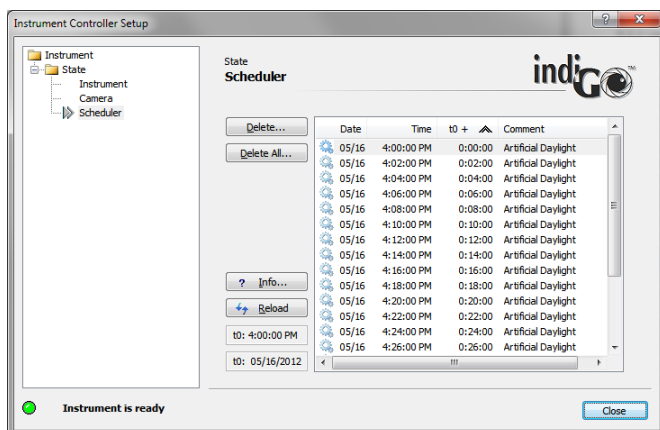


On the next page the **<Start Execution>** time can be selected. In the sample above, the first measurement will be executed on Wednesday the 16th of May at 16:00:00. When "Start Straight Away" is checked the start time cannot be entered. In this case the action starts right after clicking on **Finish**. All other repeats will start relative to this start time.

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 16th of May at 16:00:00 and the second will be executed Wednesday the 16th of May at 16:02:00.

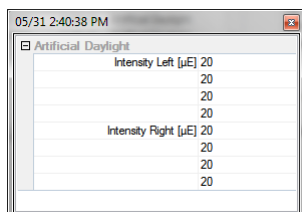
The measurements will be executed in the background by the scheduler and will be sorted automatically into the indiGO structured tree.

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



The scheduler shows the list of scheduled measurements and control commands with absolute starting time and relative time. The time of the first event in the list (when the scheduler was empty before) is treated as time zero.

To highlight an item just click on it. To highlight more than one item press the CTRL key while clicking on the items. A doubleclick on a single, highlighted item or clicking on [? info...](#) will show detailed information about the event.



Highlighted items can be deleted by clicking on [Delete...](#). To delete the whole list of items click on [Delete All...](#).

To update the list, click on [Reload](#). This will remove past events.





## 5 System Description

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## 5.1 Use and Function

*NightSHADE LB 983* is an effective 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, for fluorescence measurements by using UV lamps or the optional white light source with goose neck light guide.

***If you are working with UV lamps or transilluminators, please observe the relevant safety precautions (face protection mask or eye protection)***



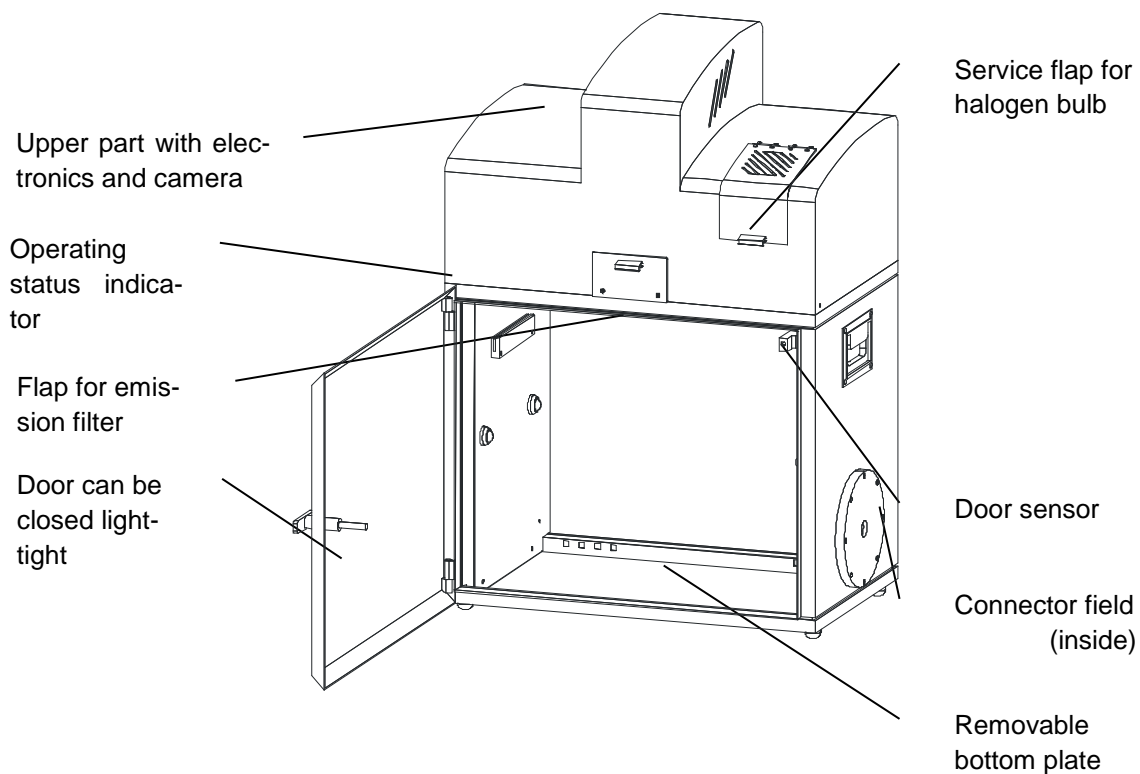
*NightSHADE LB 985* includes the following components:

- **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 effective **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.



**Front side**

- Light-tight door with handle to close the acquisition chamber
- Door for loading and unloading the filter slider for fluorescence emission (LuFlu only)
- 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
- Connector field
- Liquid cooling connectors (for LED panel)
- LED panel control connector
- Outlet of the fluorescence light for connection of the illumination light guide with optical switch
- 4 fibre optic illumination light guides for fluorescence illumination (with -40 version only)

**Rear panel/Top part**

- Connection ports
- On/off switch
- Mains fuse
- Mains connector
- USB B port (in)
- USB A port (out – for side view camera)
- Camera power outlet (for side view camera)
- Liquid cooling in/outlet (for LED panels)
- Ventilation slits

**At the side**

- Carrying handles
- Camera bayonet for side view (left)
- Flange port for external feed through

**Bottom**

The NightSHADE stands on four feet; the height of these feet can be adjusted to balance 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)

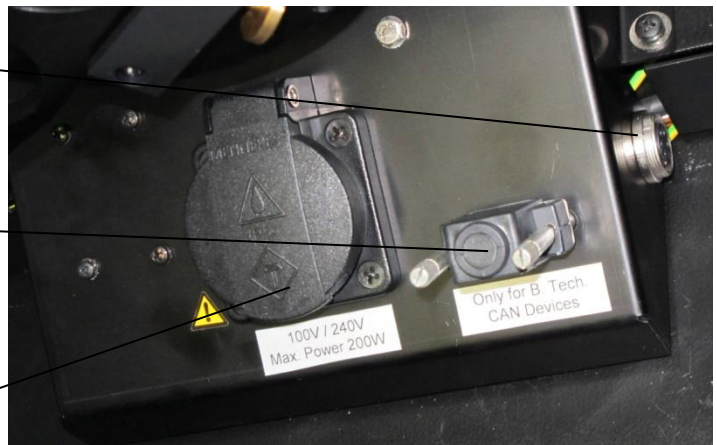
Four LED's installed on the walls of the dark box ensure constant illumination of the acquisition chamber. However, the illumination depends on the camera setting and with very low camera position it can be affected adversely. If necessary, an additional light source has to be installed (power is supplied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

- Round sockets:* Control connector for LED panels (left and right)
- CAN socket:* System connectors to control instrument options (e.g. turn table)
- Mains socket:* Mains socket enabled via software



The mains socket is controlled through the software (see chapter 4.2.4) To prevent exposure to dangerous UV light when using e.g. a UV transilluminator the socket will switch off while the door is open.  
**Max. power outlet is 200VA.**

The CAN socket controls external system options such as the turn table (see chapter 10.1.2) or the temperature controlled measurement table (see chapter 10.1.5).



**When no external equipment is connected the dummy plug (terminator) must be connected to this socket to ensure a proper termination of the internal bus.**

The two round connectors at both sides of the connection box are the power supply and control outlet for the optional LED panels (see chapter 10.1.1).



**Connect the LED panels only while the instrument is powered off to prevent electrical damage of the LED panel.**

### 5.3.4 Camera and Lens

NightSHADE LB 983 can operate with different camera systems. The following cameras are supplied:

- NightSHADE Cam Ikon, hermetically vacuum encapsulated and cooled down by a Peltier element to -70°C (the operating temperature is reached after about 10 minutes).
- To ensure the proper operation of the camera cooling the ambient temperature should not exceed 28°C.
- NightSHADE Cam Luca, cooled emCCD camera with thermoelectrical cooling down to -20°C.

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

Factory setting for the focus is set to the base plate. If other samples are used the focus must be adjusted manually.

***Maximum sample size for standard resolution images:***

Ikon: 230 x 230 at baseplate level up to 130 x 130mm (sample must be raised up).

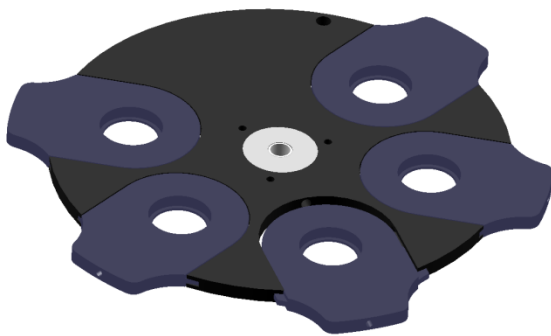
With Macro lens: 80 x 80 at baseplate level up to 15 x 15mm (sample must be raised up).

**Discharge electrostatics before taking out the camera.**

**Clean the camera and lens only with special cleaning products from your photo shop (see page 114).**

### 5.3.5 Filter Wheel

The filter wheel is installed below the camera. The filters are located on specific filter holders. These holders can be slid into the filter wheel.



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.

In the filter manager you can specify filter properties. Make sure the filter numbers printed on the filter holder matches the filter position indicated on the filter wheel.

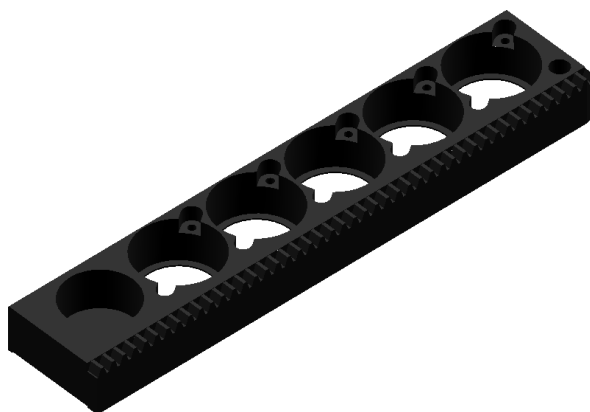
*Filter position 5 should remain empty for the acquisition of photographic images.*



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


**Filters can be exchanged by manually moving the wheel while the instrument is turned off.**

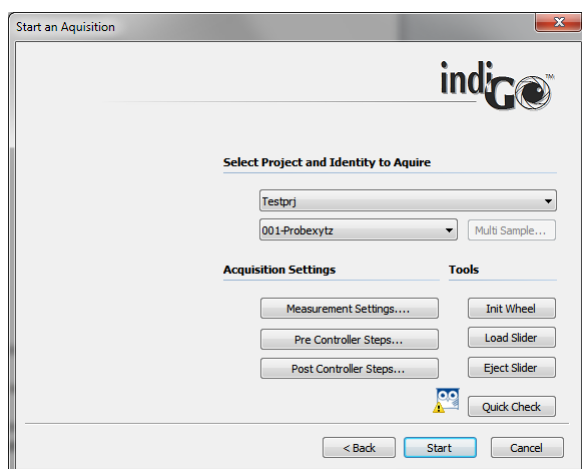
### 5.3.6 Filter Slider



The filter slider can accommodate five excitation filters with a diameter of 25 mm (or 1 inch). It is located under the flap on the right top side of the instrument. A light blocking knob keeps out light to ensure best performance. To get access to the slider just remove the knob.


The filter slider can be ejected via 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).

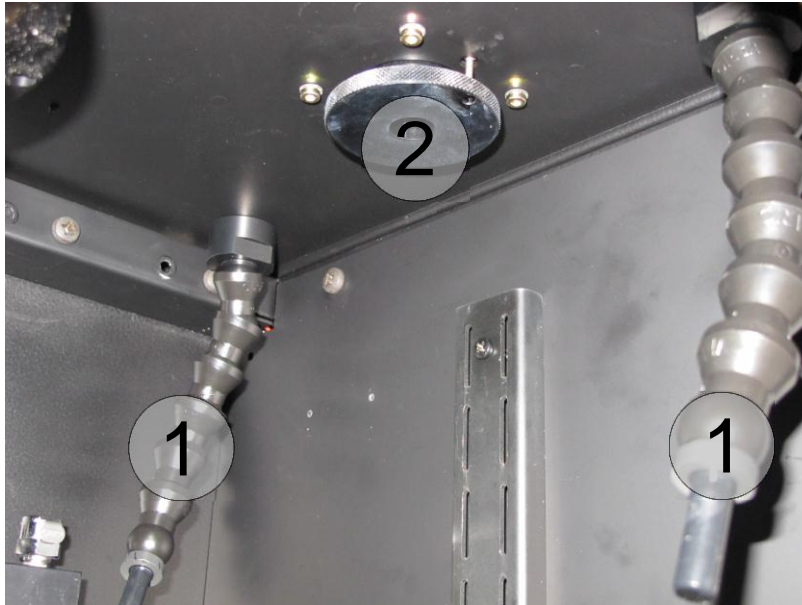
To reload the slider select . After that the slider will be initialized by the instrument.

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

### 5.3.7 Fluorescence Illumination

The built in halogen light source together with the filter slider create the excitation light for fluorescence measurements. The light is guided into the dark box using a 4 fold fibreoptic gooseneck (1). The fibres can be modified by hand in order to offer the best possible illumination.

For additional illumination devices such as a double goose neck (see 10.1.7) or the line light (see 10.1.6) an auxiliary light output port (2) is located at the right side at the ceiling of the dark box.

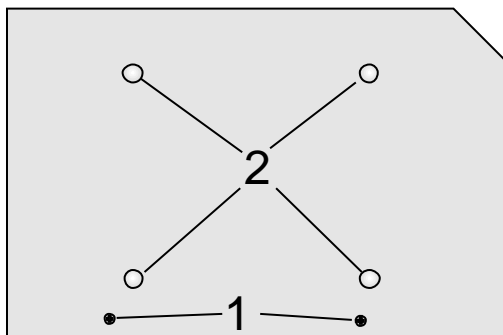


When the ring (2) is in the lower position, the light is guided to the 4 fibre optic light guides. When pulling the ring to the upper position an optical switch guides the light to the auxiliary light output port. The light guide is fixed in the socket by spring loaded balls. To remove it pull the light guide slightly.



### 5.3.8 Bottom Plate

The bottom plate helps you to position the acquisition objects. It includes two bolt heads (1) on the front panel to help you position and fix the samples or sample masks accurately. In addition, there are four wells (2) for accurate positioning of transilluminators.



The bottom plate can be removed for cleaning, if liquid was spilled.

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.

### 5.3.9 Top Part of Acquisition Device

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

To open lift up the lid.

Inside 2 connector are visible. One is for the camera power supply, the other is the USB data-port to control the camera. Remove the cables before removing the camera.

The camera can be taken out by turning it counter clockwise until the two red dots are matching each other. Now the camera is unlocked and can be removed by lifting up the camera.

**Please note:**

The ventilation slits of the cooler must always be open!

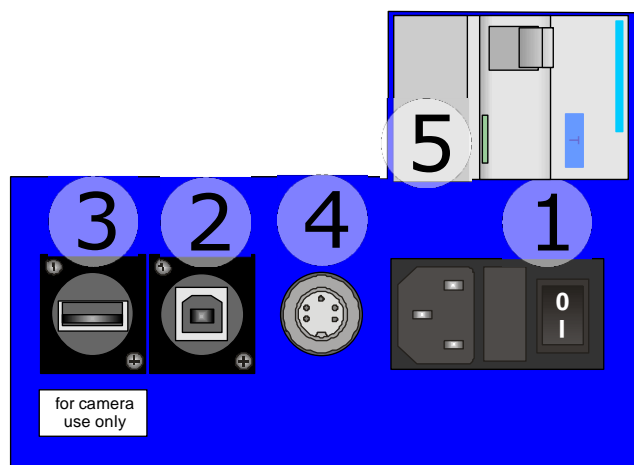
### 5.3.10 Connections at the Rear Panel

The power supply and device communication ports are located on the rear panel of the NightSHADE.

Plug the power cord into the mains inlet (1). The main power switch is located next to the mains inlet.

Connect the NightSHADE to the PC via the USB B-socket (2) on the rear panel using a USB cable (A to B).

The 7-pin Tuchel socket (4) is the power supply for the side mounted camera, the



USB A socket (3) is used for the control of the side view camera.

The cooling liquid connectors are located on the lower side of the rear panel. These quick tube connectors connect the chiller to cool down the LED panels.

The *Residual Current protective Device* (5) is switched on using the grey handle, so that the “I” is shown (“0” indicates off). The blue button is to test the safety cutoff function (false current). The operation and testing of the device must be according to DIN EN 61557-6 (VDE 0413-6).

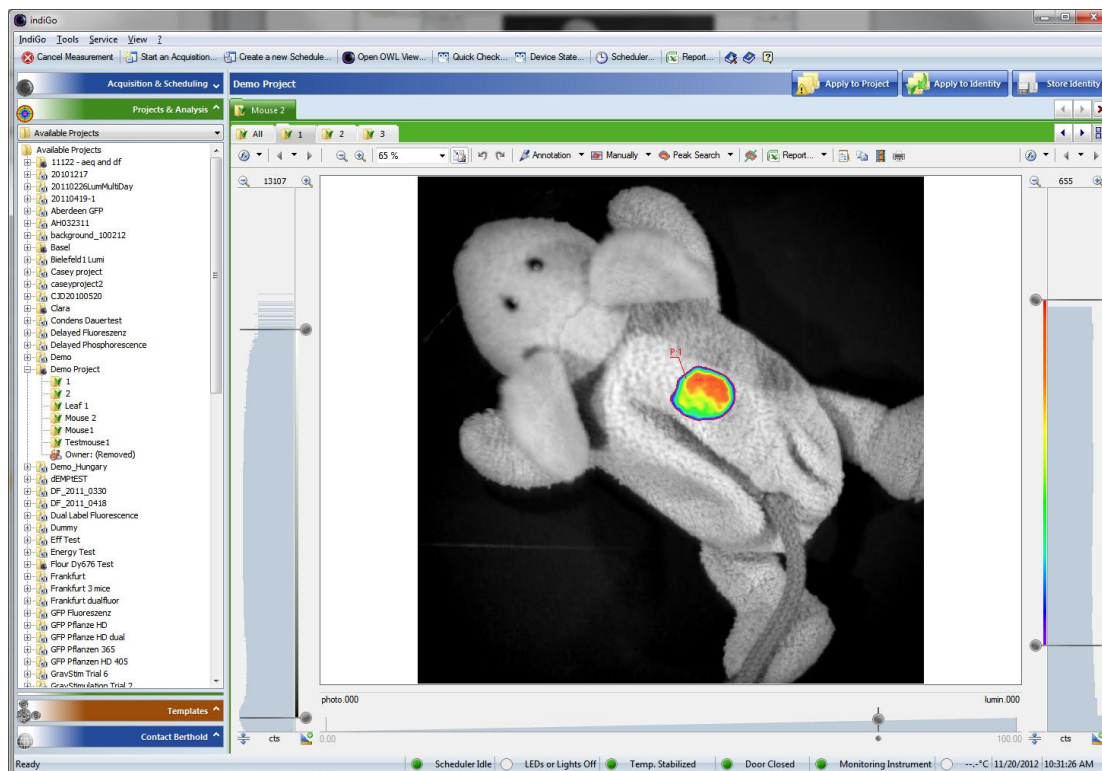
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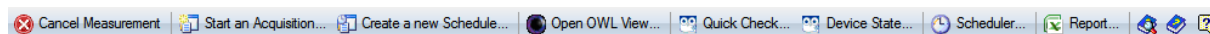
## 6.1 Graphical User Interface

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

Measurements are automatically displayed as overlay.



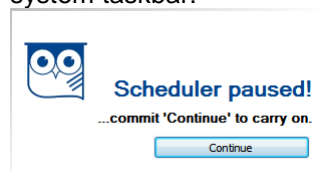
## 6.2 Application Toolbar

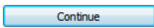


On the toolbar you find the following commands:

- **Cancel Measurement**

Will cancel the currently running measurement. The following message will show up in the system taskbar:



To continue the operations in the scheduler click on . Otherwise all actions are paused.

- **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.

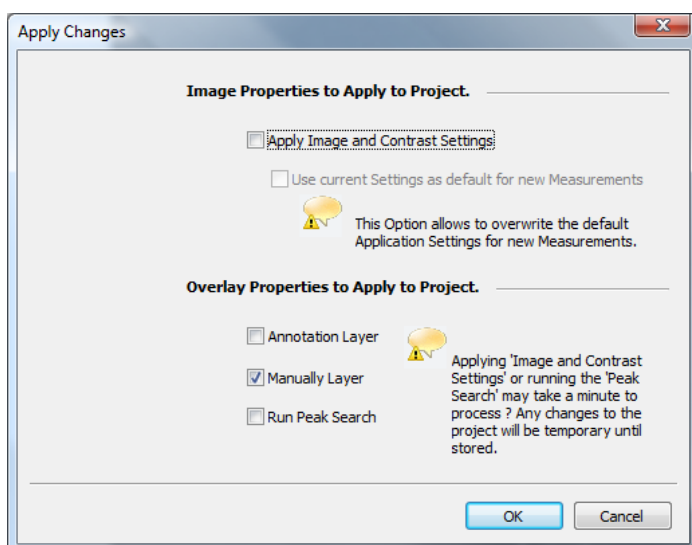
- **Open OWL View**  
Start the indiGO image viewer.
- **Quick Check**  
Start the **<Quick Check>** utility to create a photo or run a measurement for test circumstances.
- **Device State**  
Open a window to display the current state of the NightShade.
- **Scheduler**  
Open the editor for the scheduler
- **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



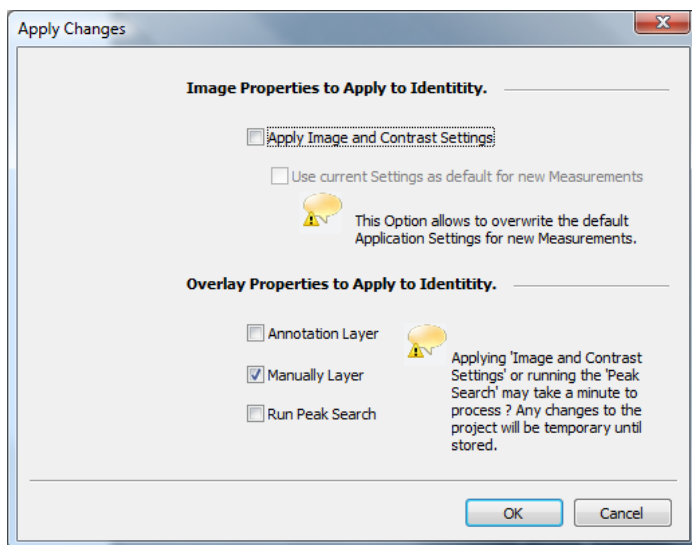
On the left of the context bar the actual selected identity name is displayed. On the right are three quick commands available.

- **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. .  
To perform this operation, all images assigned to the selected project will be opened. According to the amount of images the operation can take some seconds up to minutes.



- **Apply to Identity**

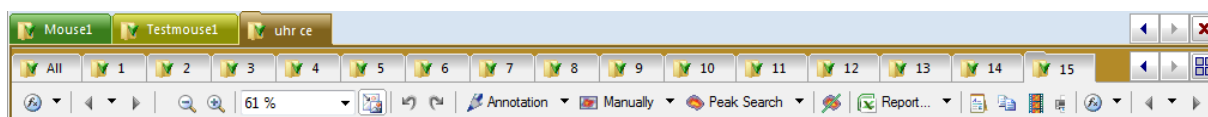
With this command the current image and contrast settings, as well as the overlay properties of the annotation and the manual layers can be applied to all measurements of the current identity. You also have the possibility to start the peak search for all measurements of the identity.



- **Store Identity**

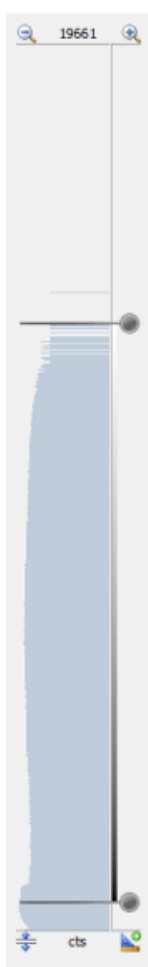
Save all changes made to the identity to disk.

## 6.4 Identities and Measurements



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

## 6.5 Contrast Slider



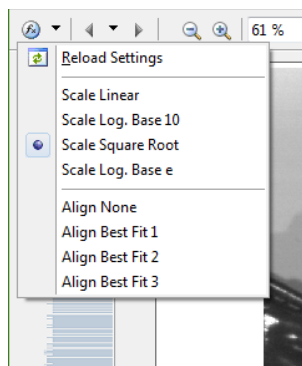
With the contrast slider on the left side of the image the brightness of the photographic display is defined. The top handle sets the upper brightness value, whereas the bottom handle is for the definition of the lower brightness limit.

The brightness can be scaled using several scaling algorithms and can be aligned automatically. These operations can be reached via 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

To access the drop down menu simply click on the arrow next to the icon shown below.



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

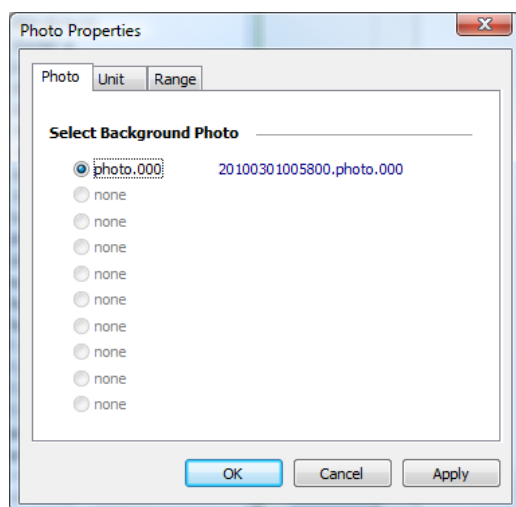
### 6.5.2 Photo Properties Dialog

To access the photo properties dialog simply click the icon shown below



- **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.



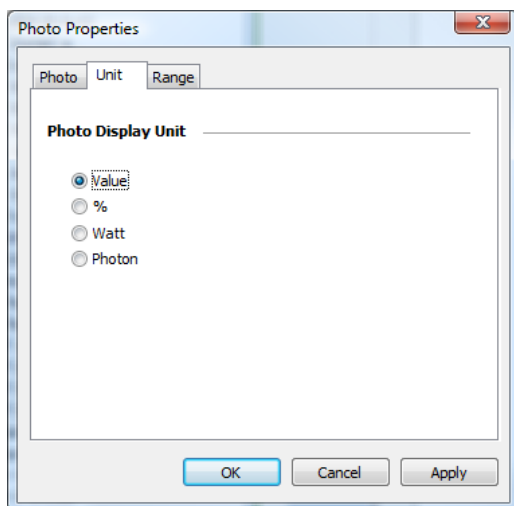


**Reference:**

The real 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.

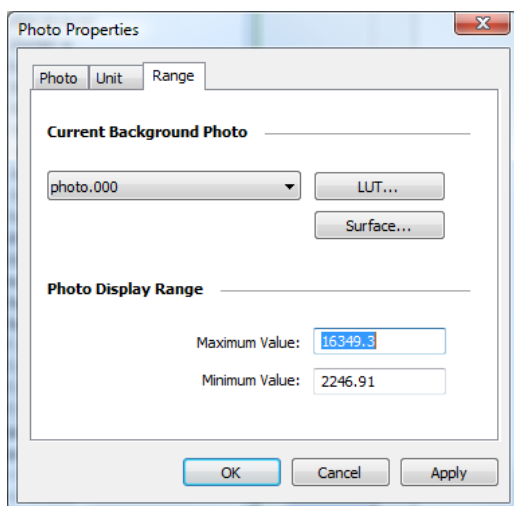
- **Unit**

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

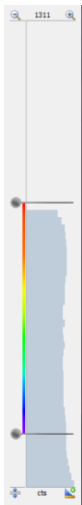


- **Range**

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.

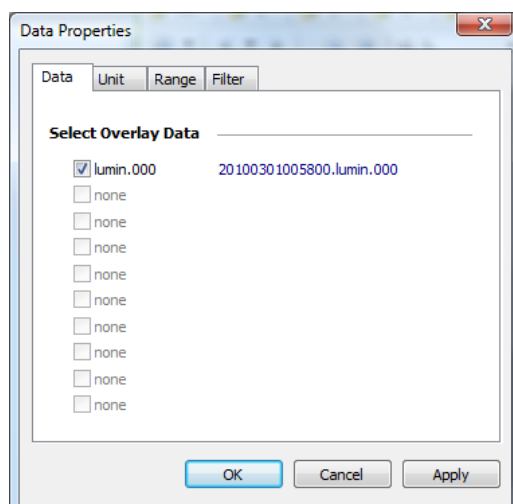
### 6.6.1 Data Properties Quick Menu

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

### 6.6.2 Data Properties Dialog

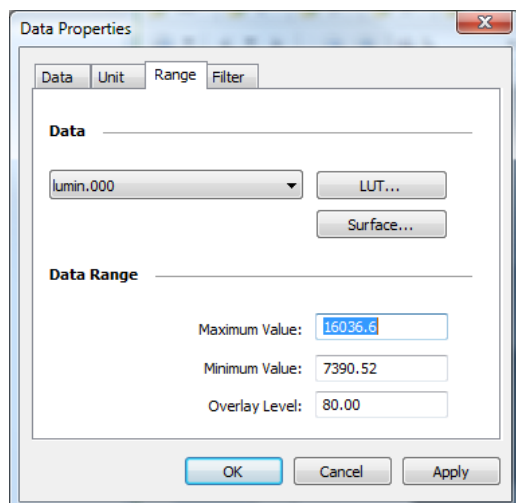
- **Data**

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.

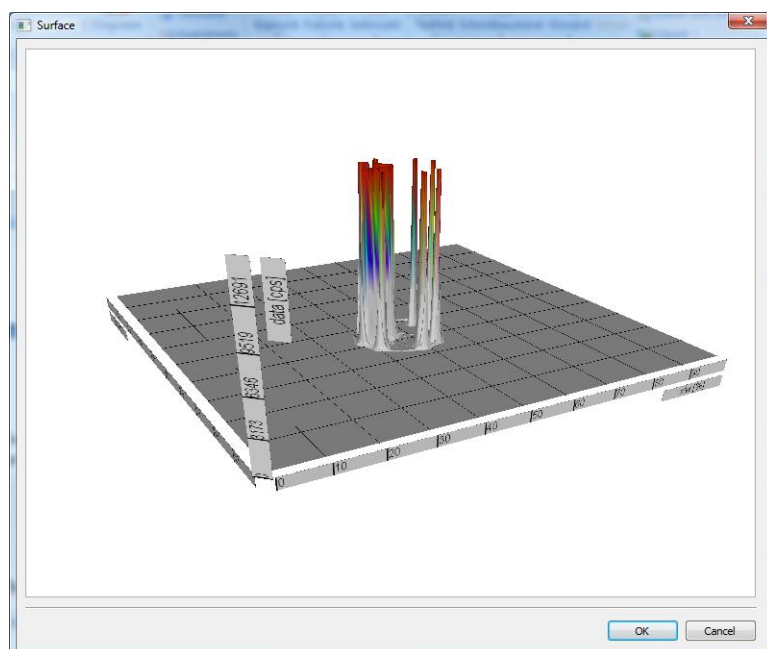


- **Range**

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

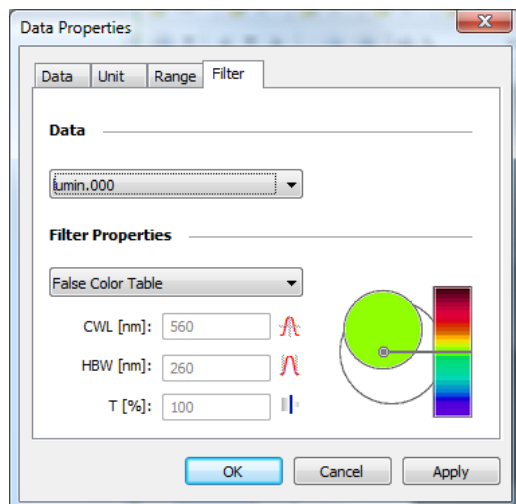


For further analysis a LUT and a surface is supported. In addition the overlay intensity can be set through **<Overlay level>**.



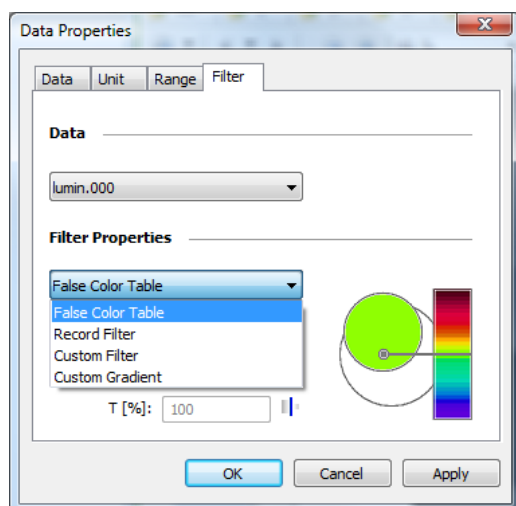
- **Filter**

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

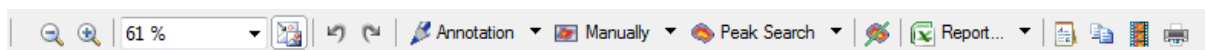


The following options are available:

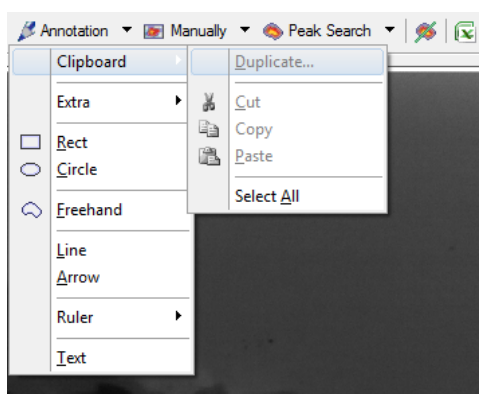
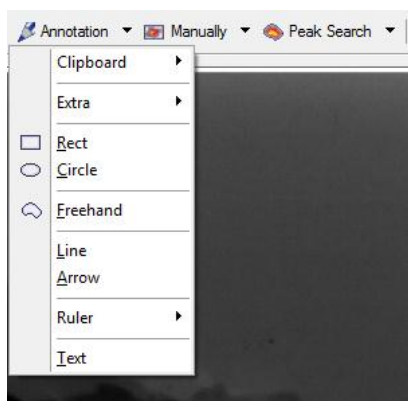
- **False Color Table**  
Activates the system default false color table
- **Record Filter**  
Activates the filter properties used for recording
- **Custom Filter**  
Enables the user to setup a custom filter, using a center wave length and a bandwidth.
- **Custom Gradient**  
Enables the user to define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

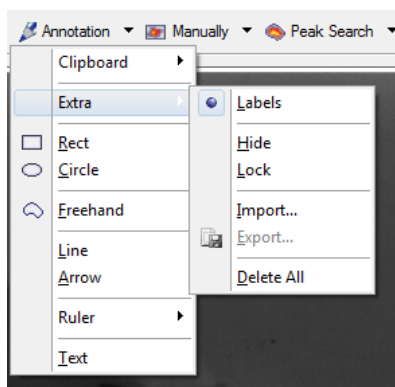


## 6.7 Toolbar

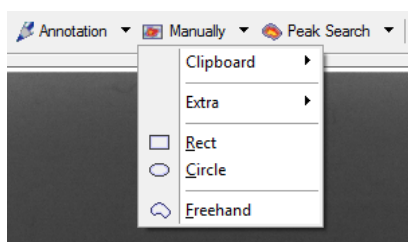


- **Decrease the zoom**  
Used to decrement the zoom
- **Increase the zoom**  
Used to increment the zoom
- **Current zoom**  
Used to setup the zoom manually, displays current zoom factor
- **Align**  
Align image into the view; used to calculate a best fit zoom factor
- **Undo (area editing)**
- **Redo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

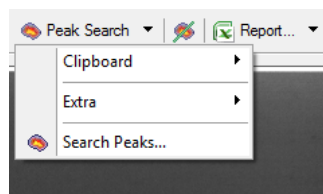




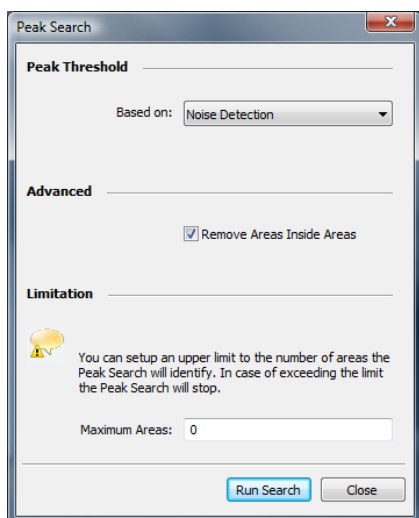
- **Manually (Menu)**  
Create manual areas



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

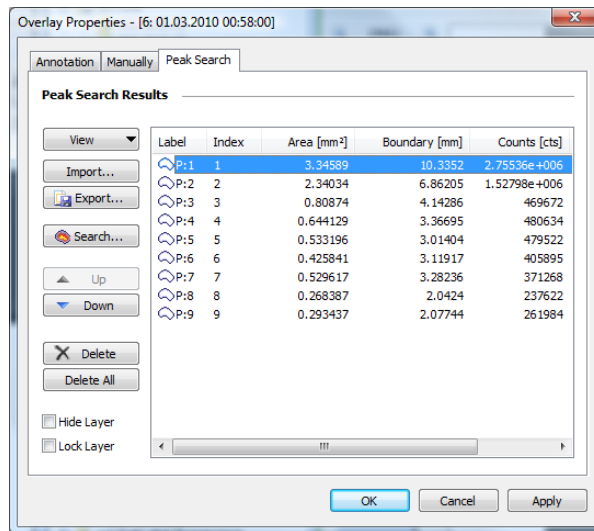


- **Peak Search (Command)**



- **Overlay Properties (Dialog)**

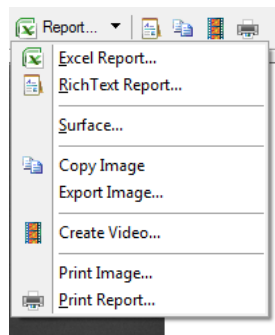
The **<Overlay Properties>** dialog can be opened via the **<Annotation>**, **<Manually>** or **<Peak Search>** commands



- **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**

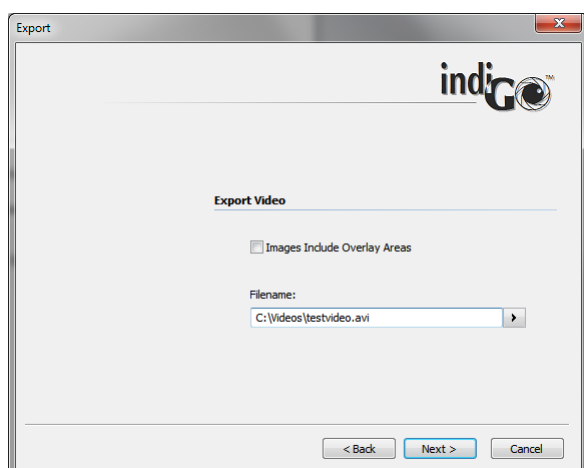
Starts the wizard to export a Rich Text report. Same function as **<Rich Text Report>**.

- **Copy current view to clipboard**

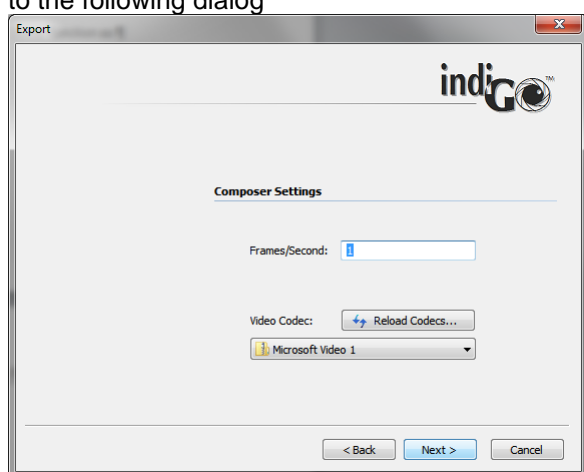
The current presentation of the measurement will be copied to the clipboard. Same function as **<Copy Image>**.

- **Render Video**

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



The output name and destination of the video must be entered. Clicking on **Next >** leads to the following dialog



The frames per seconds for the video can be entered here. Depending on the amount of sequence images this will define the length of the video. A codec must be selected. When running this function the first time, all available video codecs must be identified by clicking on **<Reload Codecs..>** The "Microsoft Video 1" codec is recommended since it is available on almost any PC.

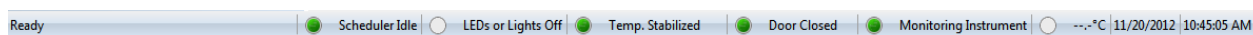
- **Print Report**

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

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



## 6.8 Status Bar



In the status bar the current status of the hardware and software is shown.

**Ready** shows the current status of the system. When a measurement is running a progress bar is shown.

**Scheduler Idle** displays the status of the Scheduler. If the scheduler is busy (measurement / control jobs pending) the icon is yellow.

**LEDs or Lights Off** indicates if the optional LED panels inside the instrument are turned on or off.

**Temp. Stabilized** shows if the camera is initialised and the cooling status.

**Door Closed** displays the status of the dark room door. When the door is open an additional warning in the Windows status bar pops up.

**Monitoring Instrument** indicates if the instrument is initialized and properly connected to the PC.

**---°C** shows the current temperature of the heated sample tray (if installed)

**11/20/2012 10:45:05 AM** displays the current date and time.

## 6.9 IndiGO Menu

### 6.9.1 New

#### Project

To create a new project, start the wizard. For further details please refer to section 4.2.5.

#### Controller Template

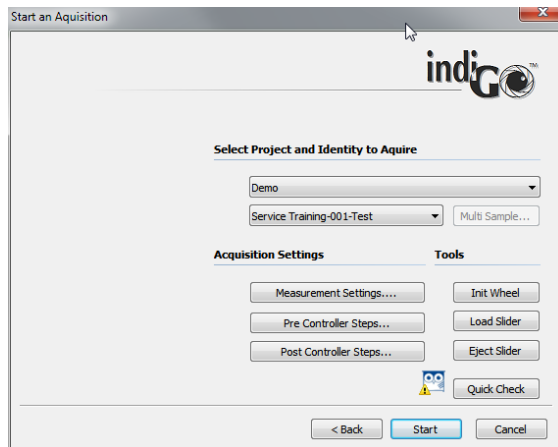
To create a new controller template, start the wizard. For further details please refer to section 4.2.4.

#### Measuring Template

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

### 6.9.2 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 4.2.6.

### 6.9.3 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 4.2.7

### 6.9.4 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

### 6.9.5 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

## 6.9.6 Print Report

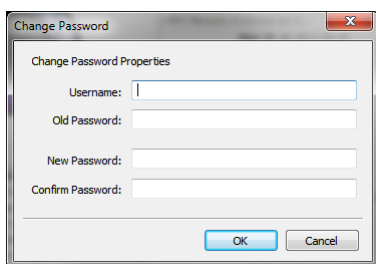
indiGO offers the possibility to create and display measurement reports. The output can be adapted to the user's requirements. For further details please refer to chapter 4.4

## 6.9.7 Logoff

This command will change the current user account.



When clicking on “Change password” a new password can be assigned. The old and new password must be entered as well as the user name.



## 6.9.8 Exit

Quit indiGO to come back later.

## 6.10 Tools Menu

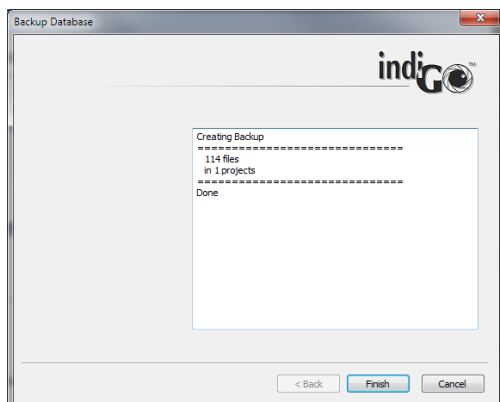
### 6.10.1 Backup Projects

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.

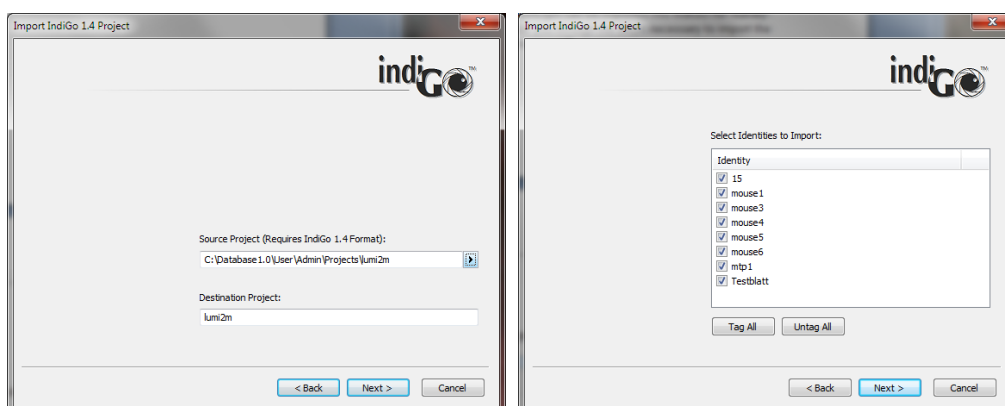


### 6.10.2 External Tools

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

### 6.10.3 Import indiGO 1.x Project

Projects and measurement data created with indiGO 1.4 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.



After launching the wizard just select the project file (.proj) of the indiGO 1.x project to import. 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.

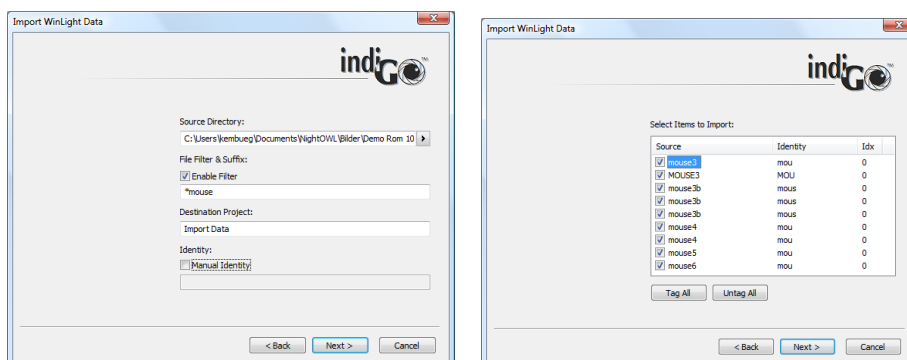
### 6.10.4 Import Winlight Data

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 “Reportergeren” application in WinLight.

Photographic image    xxx\_yyy-p.fts  
Signal Image            xxx\_yyy-F.fts

Only image pairs (signal image plus photo image) can be imported.

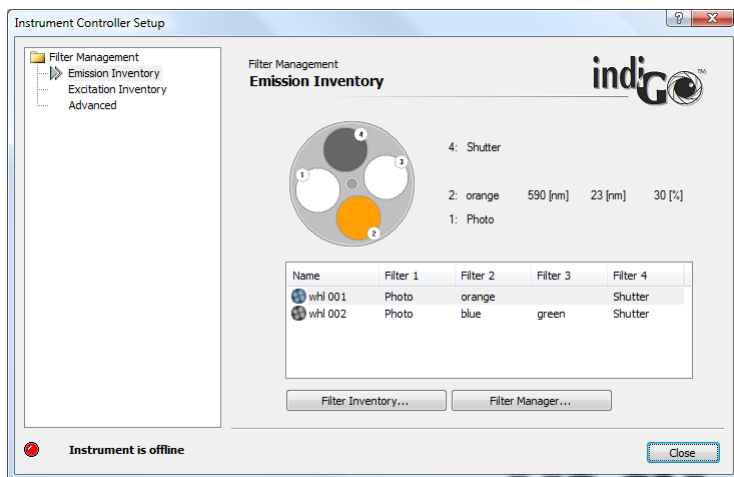


Using this structure xxx will be taken as SampleID (Identity). The 3 digit number yyy represents the sequence image number. The suffix defines the image type (photo -p; signal -f) .

## 6.11 Service Menu

### 6.11.1 Filter Manager

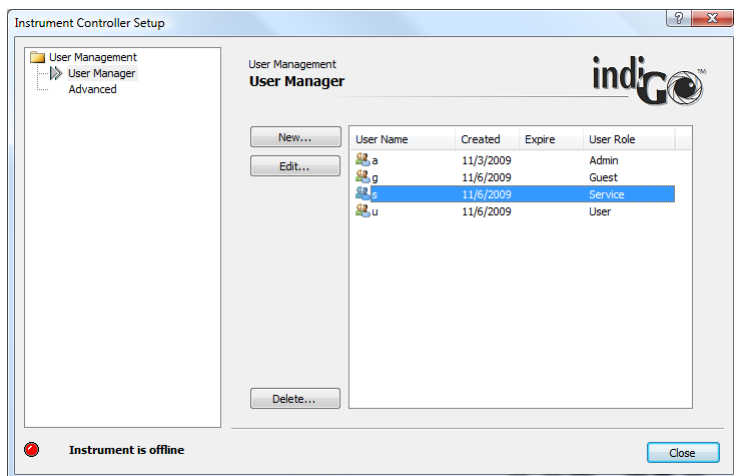
This command will start the indiGO filter manager.



For further details please refer to section 4.1.14

### 6.11.2 User Manager

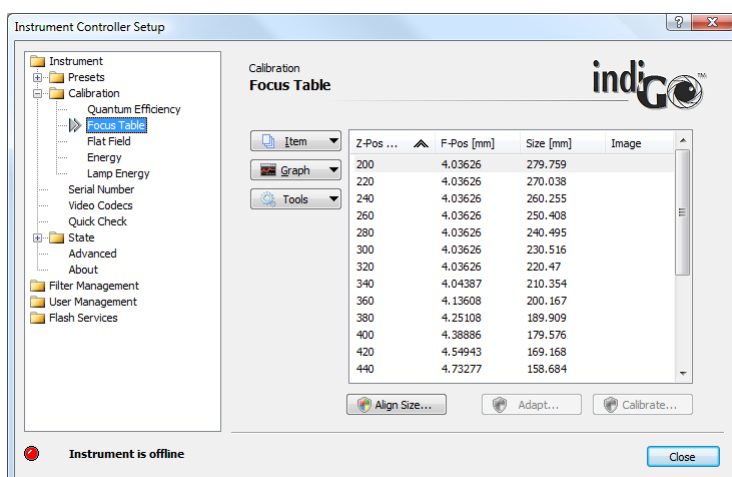
This command will start the indiGO user manager.



For further details please refer to section 4.1.12.

### 6.11.3 Controller Service

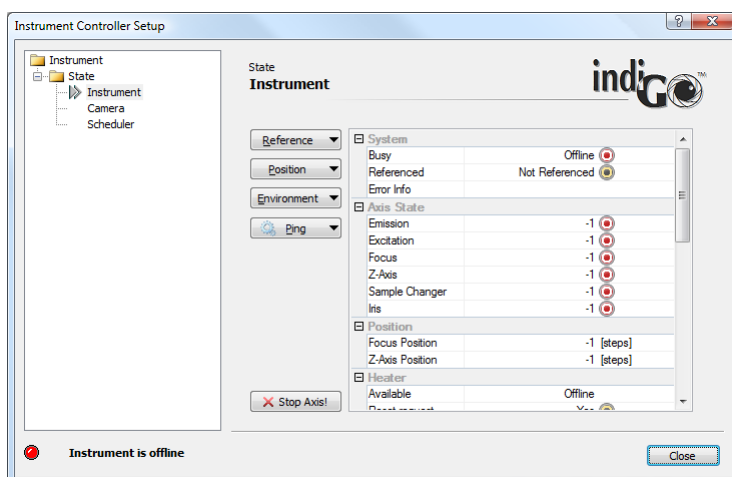
The <Controller Service> command will start the **Instrument Controller Setup**.



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

### 6.11.4 Device State

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



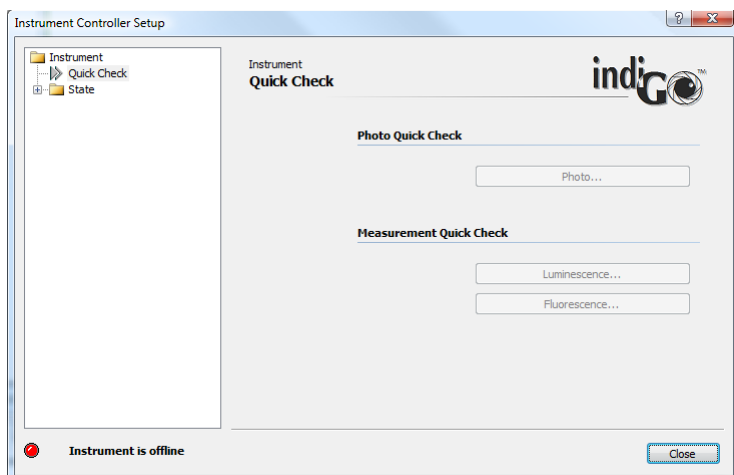
Raw device commands and test operations can be executed using the context command buttons.

### 6.11.5 Transport

This menu item has no functionality using the NightSHADE.

### 6.11.6 Quick Check

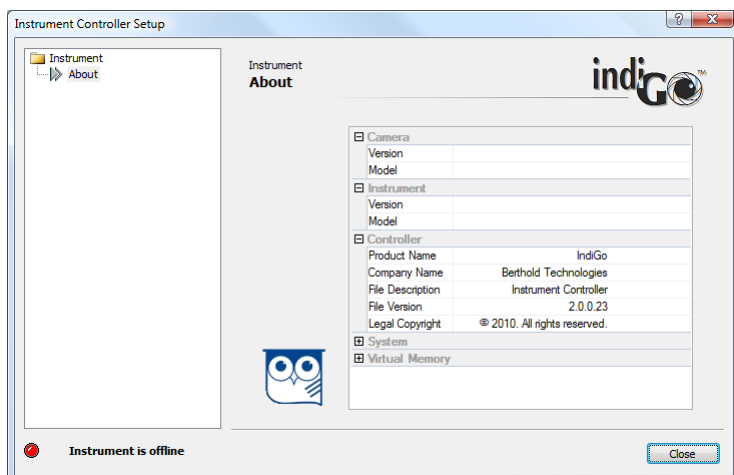
The **<Quick Check>** command can be used to get access to highlevel quickcheck commands for photo, luminescence and fluorescence.



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

### 6.11.7 Controller Version

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



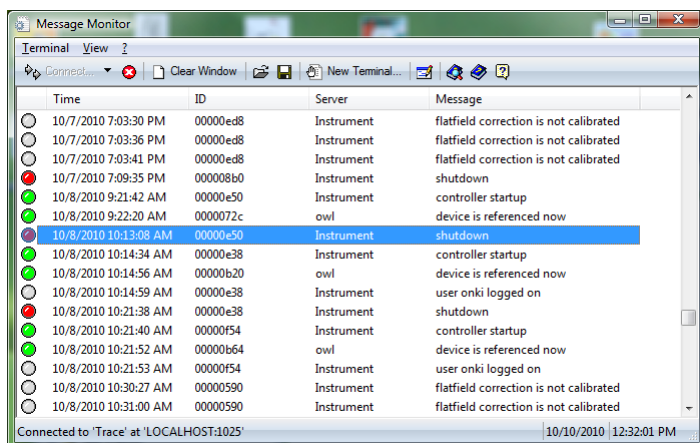
**Please note:**

Watch the owl while moving the mouse.

### 6.11.8 Messages

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





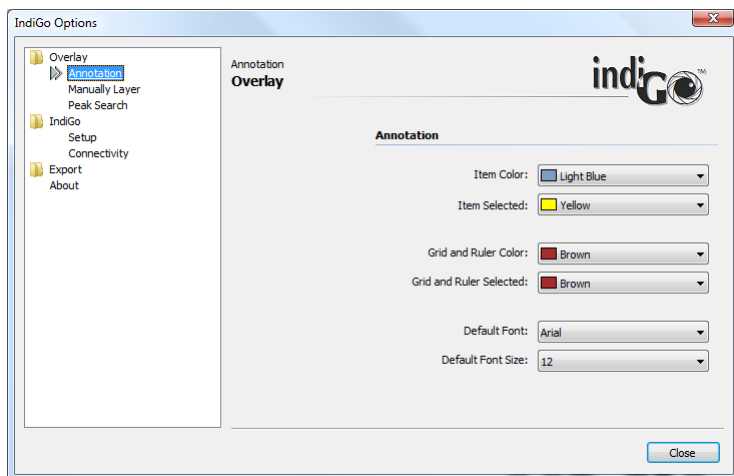
The screenshot shows the 'Message Monitor' window with a toolbar at the top containing 'Connect...', 'Clear Window', and 'New Terminal...'. Below the toolbar is a table with four columns: 'Time', 'ID', 'Server', and 'Message'. The table contains 15 rows of log entries. The entry for '10/8/2010 10:13:08 AM' from 'Instrument' with the message 'shutdown' is highlighted in blue. The status bar at the bottom indicates 'Connected to 'Trace' at 'LOCALHOST:1025'' and shows the current time as '10/10/2010 12:32:01 PM'.

Time	ID	Server	Message
10/7/2010 7:03:30 PM	00000ed8	Instrument	flatfield correction is not calibrated
10/7/2010 7:03:36 PM	00000ed8	Instrument	flatfield correction is not calibrated
10/7/2010 7:03:41 PM	00000ed8	Instrument	flatfield correction is not calibrated
10/7/2010 7:09:35 PM	000008b0	Instrument	shutdown
10/8/2010 9:21:42 AM	00000e50	Instrument	controller startup
10/8/2010 9:22:20 AM	0000072c	owl	device is referenced now
10/8/2010 10:13:08 AM	00000e50	Instrument	shutdown
10/8/2010 10:14:34 AM	00000e38	Instrument	controller startup
10/8/2010 10:14:56 AM	00000b20	owl	device is referenced now
10/8/2010 10:14:59 AM	00000e38	Instrument	user onki logged on
10/8/2010 10:21:38 AM	00000e38	Instrument	shutdown
10/8/2010 10:21:40 AM	00000f54	Instrument	controller startup
10/8/2010 10:21:52 AM	00000b64	owl	device is referenced now
10/8/2010 10:21:53 AM	00000f54	Instrument	user onki logged on
10/8/2010 10:30:27 AM	00000590	Instrument	flatfield correction is not calibrated
10/8/2010 10:31:00 AM	00000590	Instrument	flatfield correction is not calibrated

Connected to 'Trace' at 'LOCALHOST:1025' 10/10/2010 12:32:01 PM

## 6.11.9 Options

The Options command allows you to setup further indiGO options.

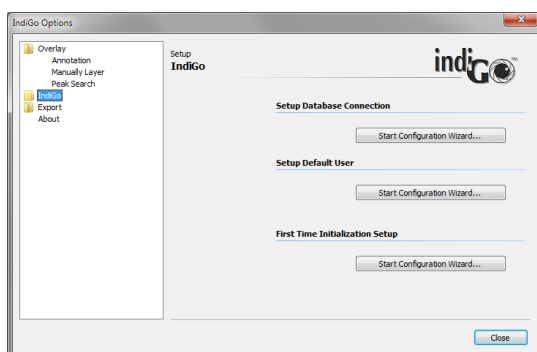


### Overlay

Access to overlay colour options. Here user specific colors for the different data types (peak search areas, manual areas etc.) can be defined.

### IndiGO

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



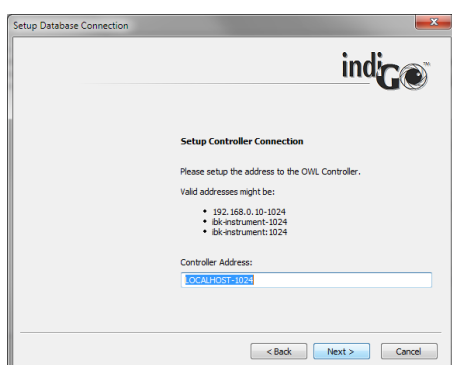
### Setup Database Connection

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.



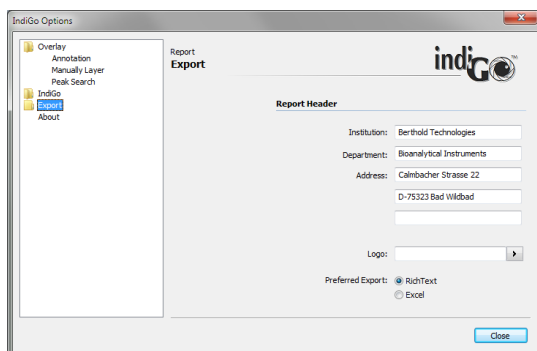
The user management can be disabled completely or a default user can be assigned.

### First Time Initialisation Wizard

This button will start the initial initialization. See chapter 4.1.10 for details

### Export

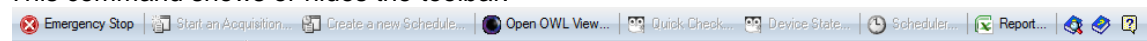
Export report settings like address, company logo and preferred format.



## 6.12 View Menu

### 6.12.1 Toolbar

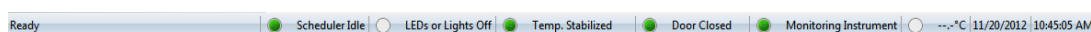
This command shows or hides the toolbar.



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

### 6.12.2 Status Bar

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.

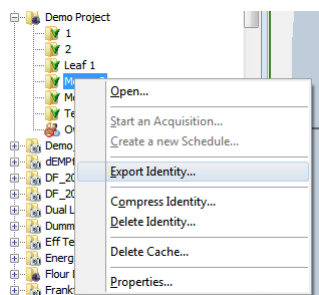
### 6.12.3 Scheduler

Open the editor for the scheduler. For further details please refer to section 4.5.

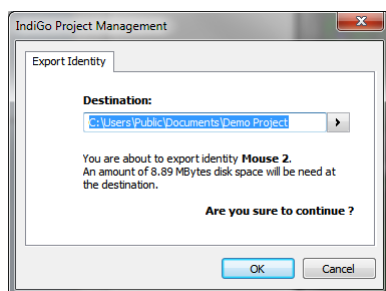
## 6.13 Batch Image Export

IndiGo allows the batch export of images within a sample identity. The images are exported as 16 bit gray scale TIFF files with meta data attached as XML file.

To start the export, select the required sample ID from the tree and right click on it.



Select "Export Identity" and a dialog box to select the destination folder will pop up.



Click on the arrow to select the desired folder and on **OK** to start the image export. A subfolder with the sample ID name will be generated. Depending on the amount of images the export could take a while and requires disk space.

The file name structure is as follows:

Sequence number (3 digits)\_original filename (date coded 20120523123456).image type (photo; lumin;fluor).imagenumber (000-009).tif

## 7 Trouble Shooting

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## 7.1 Hardware

### 7.1.1 Door status always open

If the door status is always open, the reason could be a disaligned door sensor. The door sensor is located at the upper right front side of the dark box. To adjust the door sensor refer to 8.2.3

### 7.1.2 Fluorescence lamp not working

The built in halogen fluorescence excitation light source has a lifetime of approx. 30h. When the lamp is no longer working replace the lamp. Refer to 8.2.4

### 7.1.3 No Fluorescence light output

When using the 4 light guides for fluorescence illumination it could happen, that the fluorescence light is not present at the light guides. In this case check the position of the optical switch (see chapter 5.3.7) the optical switch must be in the lower position to get light output at the 4 fibre optic light guides.

## 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.

### 7.2.2 USB-Driver installation fails on 64 bit systems

On 64 bit operating systems such as Win7 it can happen, that the USB-drivers for the camera and the instrument are not properly installed. In this case a manual installation of the drivers through the Windows device manager is required. This method requires the use of the original drivers since the windows install methods needs to know the location of the drivers. These drivers are located on the installation media or in the ZIP file from the internet. They can be found as follows:

- Instrument drivers: indigo\ins\exec\usb\ftdi\64BitOrig
- Camera drivers: indigo\ins\exec\usb\andor\64BitOrig

To install drivers manually please refer to the corresponding windows documentation.

Using the latest indiGO version this problem should not occur as the drivers are installed automatically if selected during setup (see 4.1.8)



## 8 Cleaning and Maintenance

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## 8.1 Camera and Lens

### 8.1.1 Removing the bottom plate

The retractable bottom plate is removable. The bottom plate is locked by a latch underneath the telescopic rail. To remove the plate open the latch on both rails. The black plastic latch is located inside the rail. After unlocking the plate it can be carefully slid out to the front.

To reinstall it carefully slide in both rails at plate to the counterpart located at the bottom of the instrument until both latches lock with an audible click. Make sure the plate is inserted properly with the knobs facing the front.

### 8.1.2 Cleaning the Dark Box

The dark box 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 locked by a latch underneath the telescopic rail should be removed (see above).

### 8.1.3 Cleaning the Camera

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

#### ***Dismantling and cleaning the camera***

- Turn the camera to unlock the bayonet lock.
- Carefully lift the camera off from above.
- Do **not** detach the cable from the camera.
- If the camera has a shutter, start an acquisition with long exposure time via the software. This opens the camera shutter at the bottom and allows you to remove dust particles.

**Caution:** Do not damage the shutter by touching it when it's closed!

- 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.

### 8.1.4 Cleaning the Lens

The lens can be cleaned when it is removed from the instrument. To do so, carefully unscrew the lens from the C-Mount thread. Hold the lens with both hands since it could be damaged when falling down on the bottom plate when the thread is completely unscrewed.

It should only be cleaned using pressurized air spray or cleaning agents available in photo shops!

To reinstall the lens hold it with both hands and carefully screw it to the C-Mount. Make sure the F-stop is set to 0,95 and locked to avoid loss of light.

## 8.2 Darkbox

### 8.2.1 Replacing the Air Filter

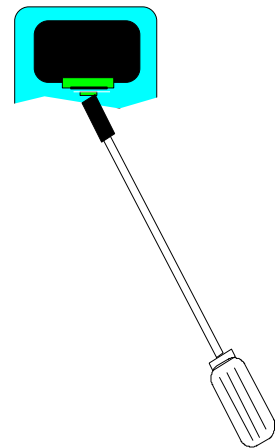
The air filter should either be cleaned or replaced, depending on the level of contamination. Remove the black ventilator cover on the rear of the instrument and clean the filter (blow it out or wash it) or replace it.

### 8.2.2 Replacing the Fuse

The mains fuses are located on the rear panel of the *NightSHADE*. 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.
- 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. (250V T 6,3AL)***

### 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 the locking screw at the bottom of the sensor using a 1.5mm Allen key.
- Push the sensor out inserting the Allen key at the rear side of the sensor housing, 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 its correct final position.
- Open the door carefully and tighten the locking screw.

### 8.2.4 Replacing the halogen lamp

The halogen lamp is located close to the excitation filters. It is protected by a black cover plate.



To replace the lamp proceed as follows. Make sure that the same type of lamp is used to guarantee proper light output.



**Be careful when touching the lamp since it could be hot when the lamp was in use before.**

- Switch off the instrument and unplug the mains connector. If the lamp was in use before allow some time to cool down the lamp.
- Open the top flap to get access to the lamp module.
- Pull out the black protection cover to get access to the lamp.
- Remove the lamp from the snap in holder.
- Unplug the lamp socket and plug in the replacement lamp.  
**Do not touch the reflector of the lamp to avoid damage of the lamp.**
- Place the lamp back into the snap in holder. Make sure the lamp is fitted properly in the holder (round edge fit with lamp reflector).
- Insert the protection cover. Make sure the cover is properly fixed and both pins are securely fastened in the mounting holes.
- Close the top flap.

## 9 Technical Data

Camera	Peltier/air-cooled slow scan CCD camera C-Mount adapter
Resolution	1024 x 1024 Pixel x 13,6 $\mu$ (back illuminated NC-100 Camera) 1004 x 1002 Pixel x 8 $\mu$ (front illuminated emCCD Camera)
Quantum efficiency (max.)	90% (Luca 65%).
Noise	Readout: $\Sigma$ 7 e <sup>-</sup> RMS (Luca <1 e <sup>-</sup> RMS, 18 at 13,5 Mhz)
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 Cooling temperature - $\Delta$ 80°C (NC-100) -20°C (Luca) Ambient temperature during storage: -20° to 70° C No condensation
Lens	standard: 25mm f = 0,95 macro: 60mm f = 2.8
Sample chamber	
Illumination	internal illumination can be adjusted via the software optional white light fluorescence illumination (400-800 nm)
Max. sample size	230 mm x 230 mm
Min. sample size	130 x 130 mm with standard lens (15 x 15mm with macro lens)
Dimensions	Acquisition device: 600 mm x 900 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. 40 kg (depending on version)
Operating voltage	100-240VAC; 50-60Hz
Power rating	600VA, (max. 200VA through internal power socket)
Fuse	250V T 6,3AL
Computer	Minimum requirements: Standard PC with 3 GHz Pentium processor (MultiCore recommended) 2 GB RAM. Free USB2 port Graphics card with 1280x1024 pixels resolution 32 bit colors, DirectX 9c Support 17" LCD monitor Windows XP, Vista or Windows7 (32 or 64 bit) ink-jet or laser printer

## 10 Appendix

### 10.1 Accessories

#### 10.1.1 LED Panels



The LED panels are used to simulate environmental conditions like day / night changes while the sample is placed inside the dark box and no measurement is running.

The LED panels are available in 2 different versions with the following wavelength configuration:

- Green panel (ID 56589-01)
  - Blue (470nm)
  - Green (520nm)
  - Red (660nm)
  - Far red (730nm)
- White panel (ID 56589-10)
  - Blue (470nm)
  - White (warm white)
  - Red (660nm)
  - Far red (730nm)



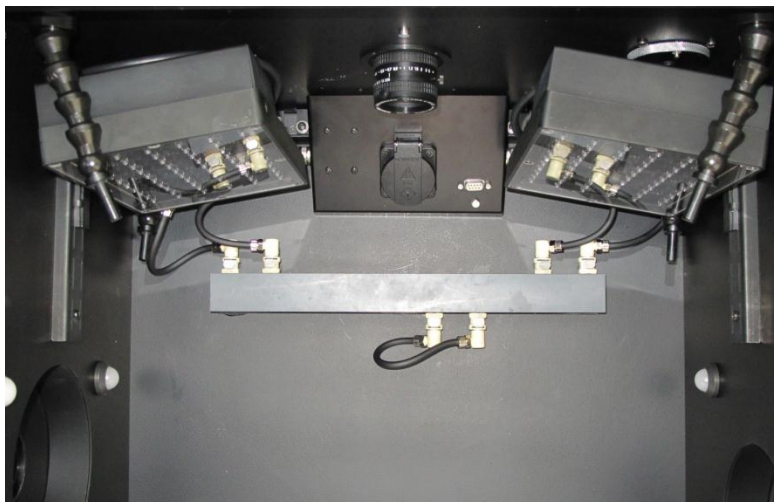
Make sure to wear standard safety glasses when using the LED panels due to the possible high intensity of the light source (CE EN 166, EN 172). These safety glasses ensure that bright, intense light intensity will not harm the beholders eyes.

The panels are coded for the left and the right hand side. They are fixed on the upper left and right side above the sample using the hooked fixing.

The electrical and cooling liquid tubing connections inside of the dark box are shown in the image below:



**Connect the LED panels only while the instrument is powered off to prevent electrical damage of the LED panel.**



The control cable of each panel is plugged into the socket at the corresponding side of the connection box (see 5.3.3).

Water cooling connects to the water supply bar located at the rear side of the dark box. The plug at the lower side of the is a bypass plug (instead of the temperature controlled sample table) and must be present to ensure a flow of cooling water.

External connectors for the cooling liquid are located at the rear side of the miniChiller and the rear panel of the NightSHADE:



Tubing connector at the miniChiller and at the rear panel of the NightSHADE

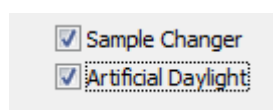


**When the miniChiller or any other device using liquids to cool the LED panel is connected to the NightSHADE it is not allowed to operate 100/230V devices such as transilluminators etc. inside the dark room due to electrical safety regulations.**



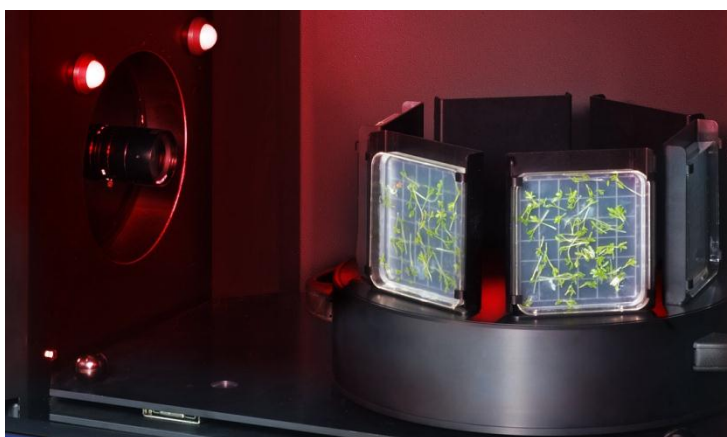
**The preset temperature of the cooling water in the miniChiller must not be set below ambient temperature since this could lead to condensation on the LED panel.**

The “Artificial daylight” control must be enabled in the indiGO service backend in order to control the intensity of the LED panels.





### 10.1.2 Turntable



The turntable is used together with the sideview option. Using the turntable up to 6 samples can be measured in a automatic sequence. 3 different sample holders can be selected:

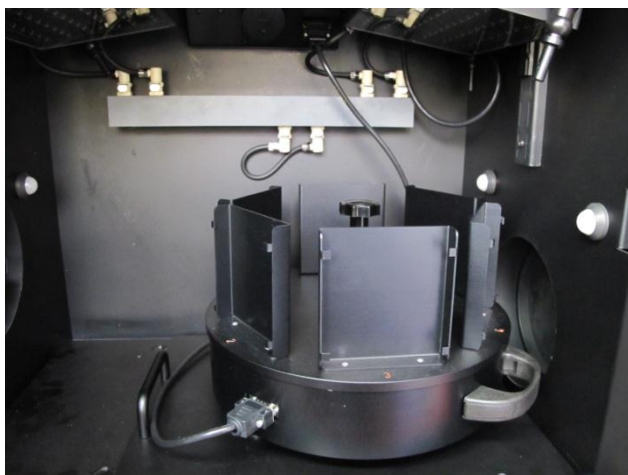
- 100mm square petri dishes
- 130mm square petri dishes
- DeWit culture tubes

#### Installation:

- Turn off the NightSHADE
- Place the turn table on the base plate that the rubber feet of the table will fit the positioning holes and markers on the positioning plate. The orientation of the turn table can be seen on the image below. Depending on the sample size the turn table can be lifted up to change the image center. In addition the positioning plate offers 2 different positions to adjust the sample size.

When using the 130mm petri dishes the turn table must be placed at the outer right position to ensure the whole plate can be imaged using the standard lens. The 100mm petri dishes can be completely measured at the left position of the position plate. In this case the adjustable feet of the turn table must be pulled out to elevate the turn table (bajonet lock).

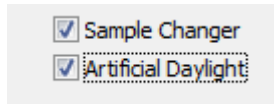




- Connect the 9 pin cable supplied with the turn table to the connector at the connecting panel at the upper position inside the dark box. Make sure the cable is not blocking the table or gets squeezed by the retractable base plate. Remove the dummy plug and keep it in a safe place. When not using the 9 pin connector, the dummy plug must be present
- Switch on the NightSHADE to initialize the turn table

Before removing the turntable make sure the instrument is switched off.

The sample changer feature must be activated in the indiGO service backend in order to control the turn table



The position of the turn table is defined by the number of the sampleID. 001 represents the sample position 1, 006 moves the turntable to position 6. 007 will use position 1 again.

If further movement of the table is required a different position can be selected using a control sequence (see. Chapter 4.2.4)

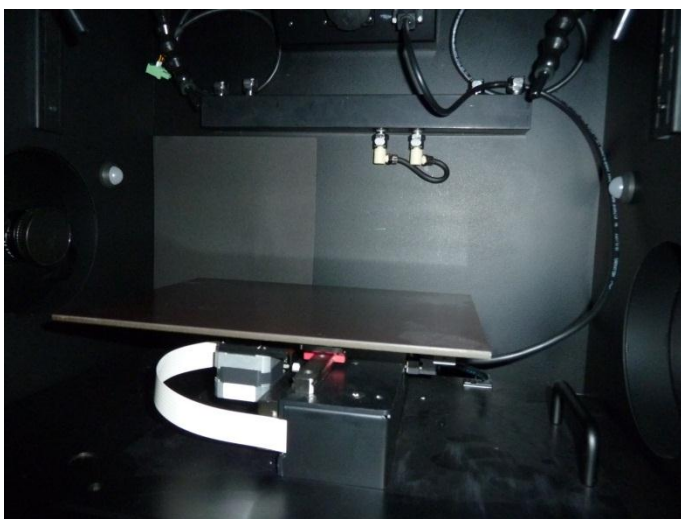
### 10.1.3 X-Y Table



The X-Y table is used to move samples under the lens in X and Y direction. The top plate is removable and coated with magnetic foil. This allows easy sample positioning and fixing. It is controlled through the indiGO software and connected to the Nightshade using an 9 pin SubD connector.

**The X-Y table is only supported with firmware version 1.08 and higher.**

The X-Y table installs inside the dark box as shown in the picture below.

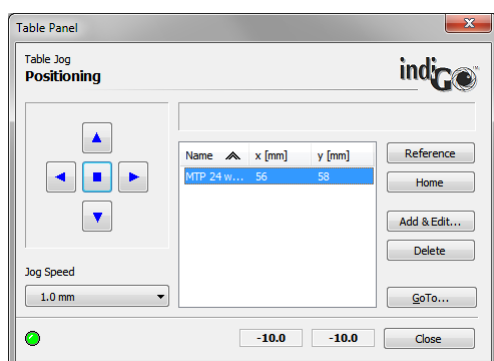


The two holes at the front work like positioning holes. They must fit in the screw heads at the base plate.

The 9 pin connector is plugged into the socket located at the socket box at the top of the inner dark box.

During power up, the X-Y table is initializing. After this don't move the table by hand as it will loose the positioning doing that. Only move the table using the software.

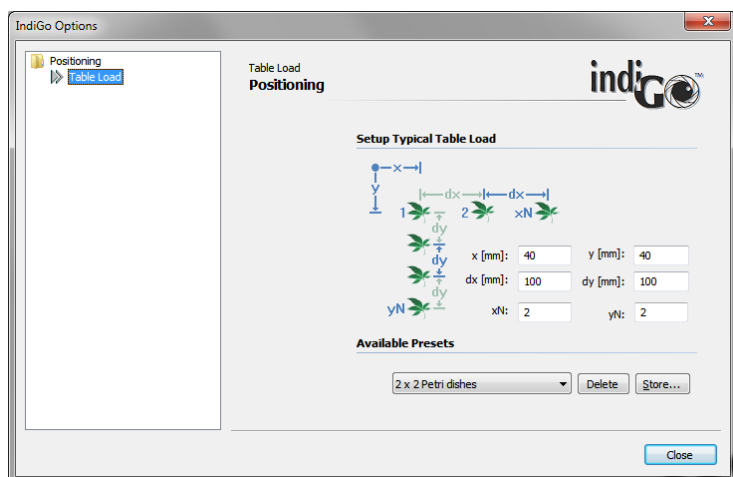
To move the plate, use the function "Table Panel" in the menu "Service" is required. After selecting the function, the following dialog box appears.



The plate can be moved around using the arrow keys. The center button stops the movement immediately. The step width can be selected in the dropdown box below. Available steps sizes are 1mm; 5mm; 10mm; 50mm; 100mm. The table moves as long as the internal limit is reached. The current position is shown in the status window at the bottom of the dialog box. To check the position with the camera a Quickcheck window can be opened in parallel (see 6.11.6).

When the table was moved by hand it can be resynched by pressing "Reference". This will initialize the whole table. Clicking on "Home" will move the table in a predefined home position. In the center of the box all predefined positions with name, X and Y position can be found. To delete an existing position just click on the entry and click "Delete". To define a new position click on "Add & Edit". If no position was highlighted, a new position can be defined. To edit an existing position, highlight the required position before clicking the "Add & Edit" button. By clicking on "GoTo" after highlighting a Position, the table will move to this position.

To measure a series of positions, a position grid can be defined by using "Table Load" from the "Service" menu. Therefore the start position (x in mm ; y in mm), the step width (dx in mm; dy in mm) as well as the number of samples (xN ; yN) are required. These parameters can be saved by clicking on "Store". A descriptive name must be entered. After saving, the setup is available through the dropdown menu.



According to the example shown above the first position will be on the top left of the plate. Position 2 is on the top right, three on the bottom left and four on the bottom right. This means the samples are handled in X first (from left to right) and then in Y (from top to bottom). Origin is at the top left corner.

According to the positioning, the samples can be measured using different sample IDs. SampleID 001 will measure on the first position (upper left in this case) , 002 the upper right, 003 the lower left and 004 the lower right sample. When using 005 the loop starts at the first position.

### 10.1.4 Transilluminator



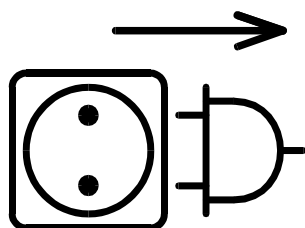
#### General Safety Instructions

When connecting the transilluminator to the power supply make sure to use a grounded mains outlet!

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!

Before carrying out any maintenance and repair work pull the power cord and make sure that all parts of the device you may possibly come into contact with 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 strictly observed.

**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 (CE EN 170) 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 banknotes 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 (CE EN 166). These safety glasses ensure that bright, intense light intensity will not harm the beholders eyes. 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 operating manual and act in accordance with the instructions contained therein. The respective competence of the operation personnel have to be defined clearly.

**To avoid any health hazards please strictly observe these safety instructions.**

**Installation of the Transilluminator**

Place the device feet of the transilluminator into the four dents in the bottom plate of the NightSHADE. This ensures that the transilluminator is always positioned perfectly. Install the transilluminator in a way 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 enter a focus height (sample height) of 103 mm plus the height of the sample used. – due to the height of the transilluminator.

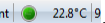
### 10.1.5 Temperature Controlled Measurement Table

The temperature controlled measurement table is used for measurements which require a temperature controlled environment.

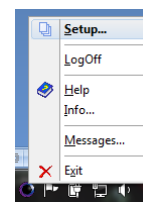
If you are working with the heated macro table, plug the connector into the 9-pole Sub-D-connector on the power box at the center top inside the darkbox (see 5.3.3.) The device must be switched off, since after the NightSHADE is switched on the heating system is detected and may get initialized.

If the heating system is plugged in during ongoing operation, it will work only after the device has booted up again. This is done by clicking on .  and selecting **<Boot Device>** from the **<Reference>** dropdown list.

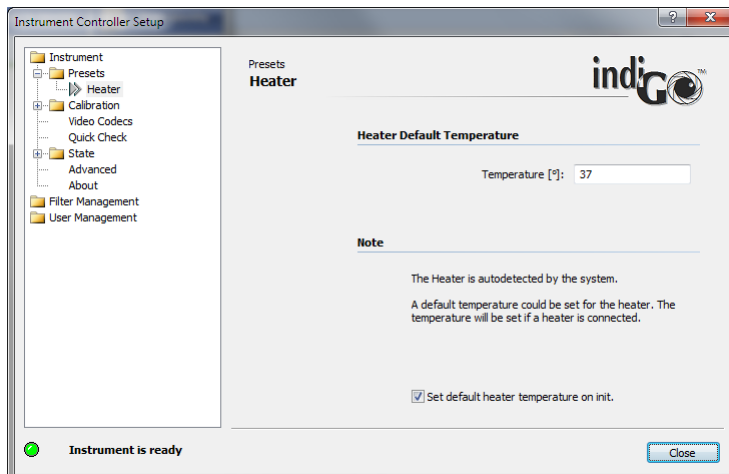


After approx. 5 to 10 minutes the heated measurement table has reached its working temperature (preset 37°C). The current temperature is displayed in the bottom status bar of the indiGO user interface .

The default temperature can be defined in the configuration backend of the software accessible through the instrument controller. Right click on the controller icon and log-in with a valid user account information selecting Setup from the context menu.



In the **<Presets> <Heater>** section the default temperature can be set. When the checkbox at the bottom is checked indiGO will set the default temperature at system initialization.



### 10.1.6 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 (see 5.3.7) located in the right, upper section of the dark box of the NightSHADE; it ensures reliable light coupling.



### 10.1.7 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 (see 5.3.7) in the right, upper section of the dark box of the NightSHADE; it ensures reliable light coupling.





### 10.1.8 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 NightSHADE. The spot with the white reflector (micro-plate position E9) emits light with an energy of approx 20nW (see individual certificate). This spot can be used to check the NightSHADE 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.

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 Customer Reply Form

Please send the Customer Reply Form to:

Berthold Technologies GmbH & Co.KG  
Technical Support  
Calmbacher Str. 22  
75323 Bad Wildbad  
Germany  
Phone: +49 7081 177 171  
Fax: +49 7081 177 446  
Email: [service@berthold.com](mailto:service@berthold.com)

or send it to **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: \_\_\_\_\_

## 10.3 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 to fill in the form!)

instrument / component: _____	serial no.: _____
<input type="checkbox"/> I hereby confirm that the instrument or component specified above has not been used with any hazardous or contagious samples or reagents	
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"/> contagious biological material 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: _____	_____
e-mail: _____	_____
phone: _____	fax: _____

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