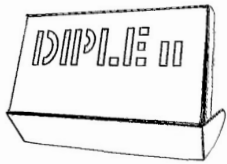


DIPLE II

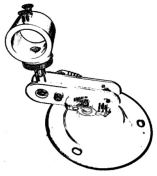
User Manual

INSIDE THE CARRYING CASE



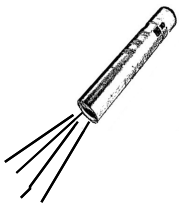
DIPLE2 Box:

A rollover box, with inside a rigid containers that works as mechanical support of the system.



Torch mounting bracket:

Lamp holder with 360° rotation and manual adjustment; for holding the torch/flashlight.



Torch/Flashlight:

LED light with Luminous Flux of 450 LM and color temperature of 5000K. Alluminum alloy structure. Voltage: DC 1.5V. It works with one AAA battery (not included).



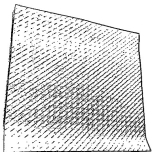
Prism:

Solid prism with surface of anodized aluminum, to reflect the light from the torch.



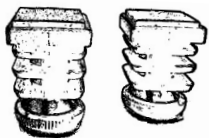
Polarizing films:

Little disk of polarizing film to place in front of the torch, for polarized light microscopy. REMOVE BOTH THE PROTECTIVE FILMS ON ITS SURFACE BEFORE USE IT.



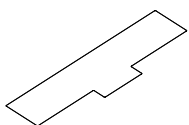
Anti-slip mat:

Mat in soft EVA, to place under the DIPLE box (black container), when its slipping is annoying.



2 levelling feet:

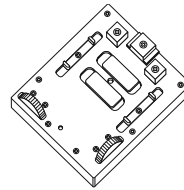
Additional mechanical stands for the phone/tablet; use them to keep the phone/tablet parallel to the lens, and to improve the whole stability, in particular when the device is large (tablet or large phones).



Sample Shifter:

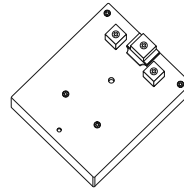
Extended, thin transparent plastic sheet to use under the glass slide, for fast, direct shift of the sample. (Not fundamental, but sometime useful).

INSIDE THE DIPLE BOX



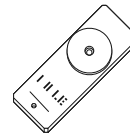
Fine Stage*:

with this stage the user can move a sample on a standard slide (76mm x 26mm) using two screw-driven systems, along two perpendicular directions. Rotating the two wheels it is possible to shift the slide positioned over the light in a controlled way. The Fine Stage can be used also like a Standard Stage, removing the two parts that keep the glass slide in position.



Standard Stage*:

with the Standard Stage the user shifts manually the sample under the DIPLE lens.

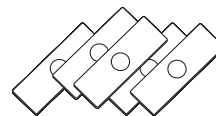


Up to 4 different obj. lenses.*

Silver Lens (25x, res. 3 µm)
Red Lens (40x, res. 2.5 µm)
Grey Lens (90x, res. 0.9 µm)
Black Lens (150x, res. 0.7 µm)

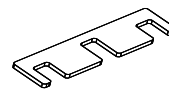


DIN464 - m3; for fine tuning of the working distance (lens-sample distance). One for each lens. One additional screw with anti-slip mat on top is an extra stand for the phone.



5 glass slides

1 Zoology, 1 Histology,
1 Botanical prepared slides,
1 concave slide +
1 standard plain slide or
*1 microscope ruler (0.01mm/division).

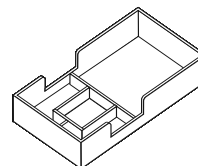


Frame to to raise the little blocks on the stage. To use when the sample is thick, and the tallest step of the central block is not enough.



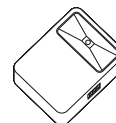
Coverslips

100 pieces of 18x18mm, n.1 (0.15mm-thick) coverslips, to cover your samples.



Box

container & supporting structure for light, stage and your phone, when the product is in use.



Light source

white LED for bright-field microscopy. Two CR2032 batteries included.



Screwdriver

Use it to:
1. Tighten/release the little blocks on the stage, for keeping the lens in the right position.
2. Turn on/off the light source.



Allen key

To fasten the screws in the stage and for the headless screws of the glass holders.*



Pipette

for liquid drops on slides.

WARNING

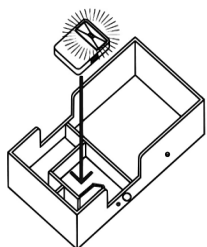
Do not shine the light directly into eyes. This may cause temporary blindness or damage to the eyes.



(*) depending on the purchased item

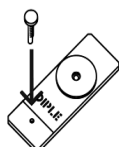
INSTRUCTIONS

The steps below are the same for the use of DIPLE with Standard Stage or Fine Stage. The Fine Stage can be used like a Standard Stage after removing the two glass-slide holders, using the cross-head screwdriver. The steps 2-9 are for all the modes of use of DIPLE with sample on the stage. The batteries of the light source in step1 last longer than the torch/flashlight, therefore we suggest to use it for bright-field microscopy.

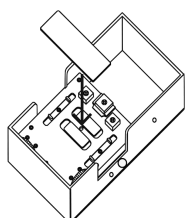


1 Turn on the light for Bright-Field (internal light):

lift the stage vertically. The light source is in its site, under the stage. Remove the insulating foil from the batteries, before switching it on the first time. Replace the light in its original position, with light on. The light must be aligned with the hole in the stage.



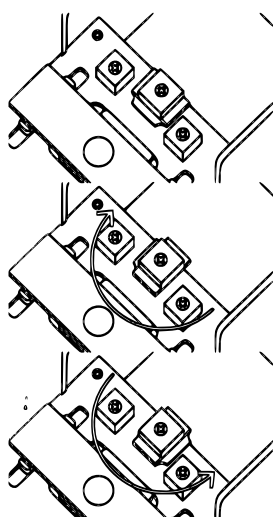
2 In the box you can find DIN464 screws (screws with knob), for the fine elevation of the lenses (one for each objective lens of your kit). Insert this screw in the hole near one end of the tile (not completely, less than half is ok).



3 Place the sample:

place your sample on a glass slide and position it in the center of the illuminated hole.

The first time use a prepared slides in the box, to get practice on the focusing procedure.



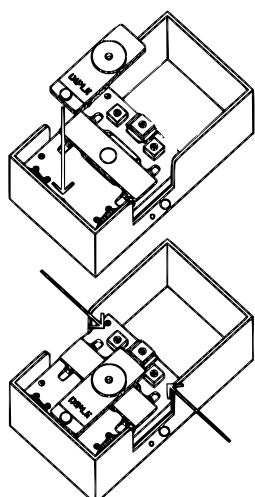
4 Set the right foot:

The block with three steps can be rotated to rise or lower the lens end. Tight it with its screw is useful also for centering the lens on the light source (in particular, useful, for the lenses of lower magnification). The lenses with high power must stay close to the sample; those with lower magnification have longer focal distance, so they use higher steps. As a rule of thumb, consider:

LOWEST STEP (I)
for lenses: Black/Grey

MEDIUM STEP (II)
for lenses: Red/Grey/Black

HIGHEST STEP (III)
for lenses: Silver/Red

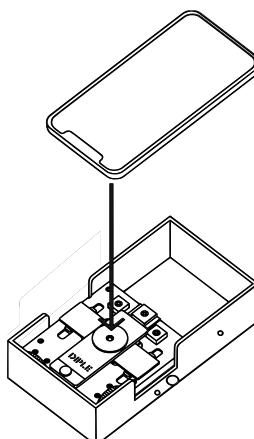


5 Place the objective lens:

the objective tile must be positioned keeping its side with the screw near the external part of the box. The screw must fit the hole on the metallic plate of the stage. The writing DIPLE is on the top side of the tile.

The tile must fit between the two lateral blocks, when it lays on the selected step.

IMPORTANT:
Tight the blocks with the screwdriver with the lens in its place, if you need to increase the stability of the lens in the focusing process.



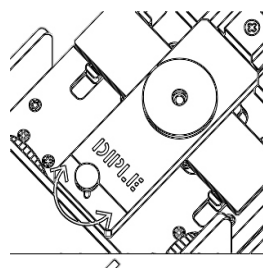
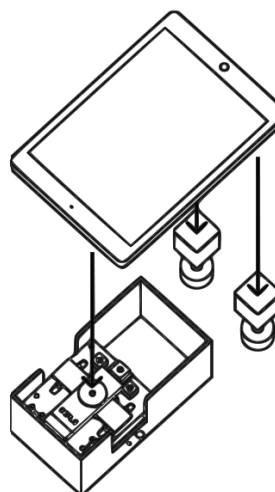
6 Place the phone:

open your favorite camera APP. For aligning the phone lens on the DIPLE lens look in your screen and move the phone close to the tile, pointing to hole in the black ring; lay the phone on the box and on the black ring of the tile.



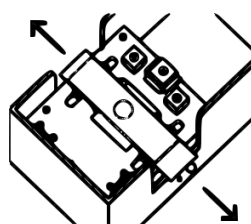
7 the ideal imaging condition is with horizontal tile and horizontal phone camera. For fine tuning, or when the sample is thick, you can use the screw feet to manage the elevation of the phone, instead of only lay the phone on the box sides. In order to increase the phone stability, you can use the additional DIN464 screw, with its anti-slip pad, in the place of the screw of the stage near the corner, as later described.

Use the feet also for tablets or large devices.



Focusing:

8 Center the circle of light in the middle of your screen. Apply a bit of digital zoom (for example 2x) in order to fill the screen and to help the automatic light balancing. Rotate the screw in the tile to move up or down the lens, until you get the right focus.

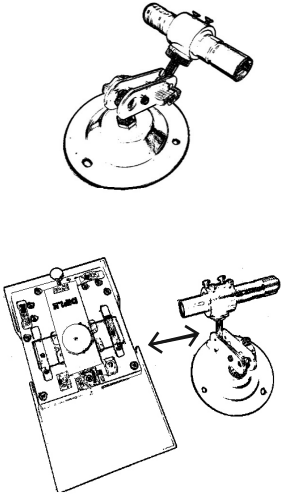


9 this part is a tool for helping fast, direct manual shifting of slides. Place it under the glass slide or under your sample. It can be useful also in the case of phones with central camera.

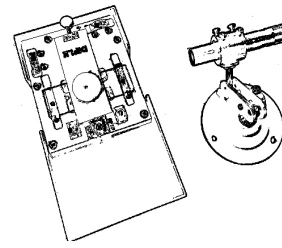
OBLIQUE/DARK-FIELD

REFLECTED LIGHT

Set-up the external light:



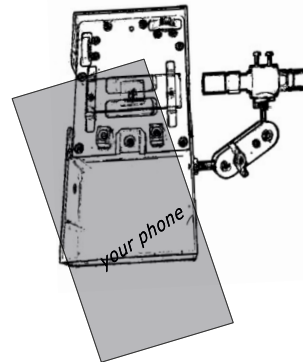
The lamp mounting bracket is made of three metallic parts: one disk, one articulated arm and one lamp holder. Mount them like in the next figure. Tight the lamp inside its ring with the two screws. The lamp works with one AAA battery (not included). Turn on the lamp using the on-off button on the rear side of the lamp. Place the lamp next to the DIPLE box, or connect it directly to the box; move it until its light goes through the glass slide.



WAY 1: SAMPLE ON THE GLASS SLIDE

When the sample is small and it can be placed on the glass slide, the process is similar the one described for dark-field microscopy.

Turn on the lamp using the on-off button on the rear side of the lamp. Place the lamp next to the DIPLE box and move it until its light goes through the glass slide to ensure proper illumination.



Lamp connected to the box:

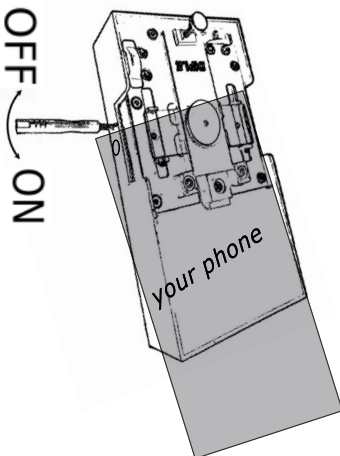
You can screw the arm supporting the flash-light directly to the box, instead of on the disk.

On both the side of the box there is a threaded hole to fit the arm.

Move the lamp according to the need and fasten all the parts.

NOTE: start using the silver or red lens, that are the lenses with lower magnification. This is a general rule, even more useful for dark-field and reflected illumination.

Align and focus your sample under the lens:



Turn on the light for bright-field microscopy and find the right focal distance. Once you clearly see your sample, turn off the light; you can do it without removing the stage, too.

You can turn on-off the light inserting the screwdriver in the hole on one side of the DIPLE box until you touch the light switch with its tip, and shifting. Keep the end of the screwdriver touching the desk surface. (Hint: try a couple of times to switch on-off the light using the tip of the screwdriver without the stage in its place, to get practice.)

WAY 2: THICK SAMPLE, OR LARGE SURFACE

When the sample can not be placed on the stage, you can observe it, in reflected illumination, also on any flat surface.

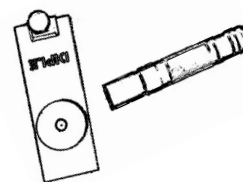
Lay the thin sample on a flat surface. Place the lens on top of it.

Turn on the torch, next to the lens, illuminating the sample.

Use the elevation screw to find the right focal distance.

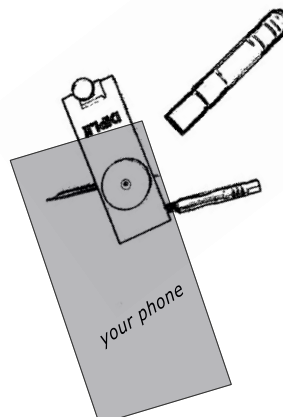
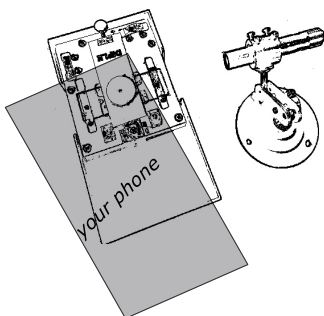
Move the torch in order to change the light intensity and angle of incidence.

When the sample is thick, you can increase the height of the lens putting a magnetic part (for example the screwdriver, or the allen key, or a nut) under the magnet on the lens tile. Then, fine tuning the working distance with the elevation screw, as usual.



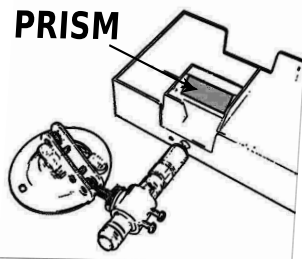
Find the right light intensity and angle of incidence:

With the light of the torch (for bright-field) off, move the torch changing distance and angle of incidence on the glass slide. In this way you will change the amount of light on the sample. The ideal light intensity and angle of incidence depend on the sample and on the lens in use. Use the levelling feet to get a good contact between phone lens and DIPLE lens, if needed.

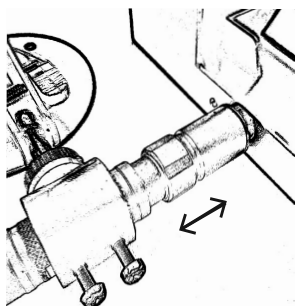
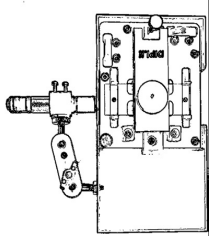


BRIGHT-FIELD (with external light)

PRISM



OR



Set-up the external light:

Place the solid prism in the space under the stage. The long side of the prism must be in contact with the farrest wall from the flashlight.

Tight the flashlight inside its ring, using the two screws.

The lamp must send the light through the larger hole in the box side; therefore, the ring with the flashlight must lay in its lowest position.

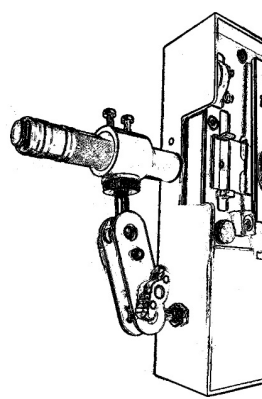
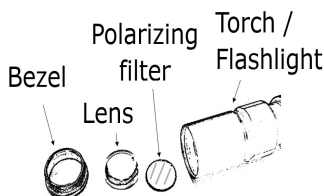
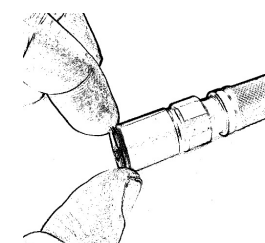
You can zoom the light beam moving the ending part of the torch, to change the beam size. The beam must be aimed toward the prism. The surfaces of the prism reflect the light toward the sample. You can use both the sides of the prism; they provide different illumination effects.

POLARIZED LIGHT MICROSCOPY

Mount the polarizing filter in the torch

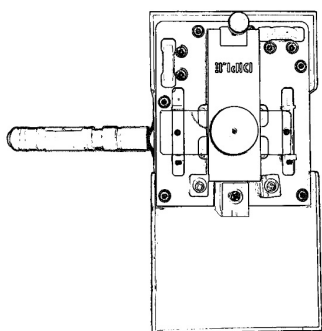
Dismount the lens from the torch, unscrewing the bezel. Place the polarizing filter, after removing both the protective films, on the flat side of the lens and insert it again in front of the led inside the torch body. Tight the lens with the bezel.

In this way, the light coming out from the flashlight is polarized.

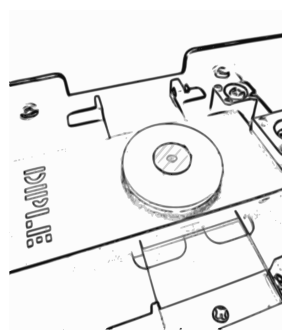


Set the system like for bright-field microscopy with light source out of the box.

Keep the holding ring near the the back side of the flashlight and turn it on; release the screws in order to let the torch to rotate. If you do not use the holder, just keep it perpendicular to the box, in front of the bigger hole.



For rapid use of the system, you can use it also without mounting the flashlight on its support, but just laying it next to the box, sending the light into the bigger hole.



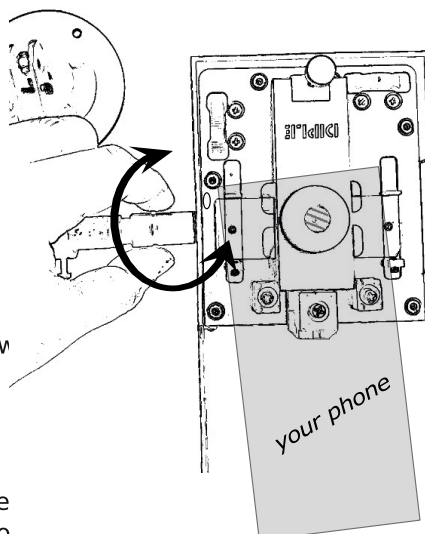
Check the polarizing effect

Every lens of DIPLE II has a polarizing filter in it. So, to see the effects of polarized light on you sample (if any) you have to use the system like for bright field microscopy, rotating the flash-light.

Align and focus your sample under the lens:

With the torch on, find the right focal distance using the elevation screw of the lens tile.

With this bright-field configuration you can add filters in front of the flashlight, for example to polarize the light (filters included in this kit), or to color the light (filters not included).

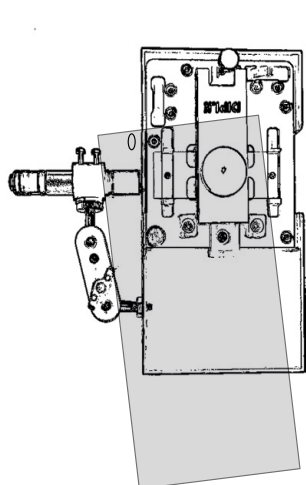


Example: Look at one hair, in particular at its root: its color will change when rotating the torch.

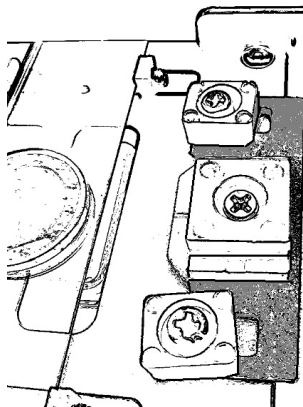
NOTE:

You can keep the polarizing filter in the torch, except if you do not want to see effects due to this kind of light.

Use the anti-slip mat under the DIPLE box, and, in particular, under the torch holder, if it is disconnected from the box. It helps to avoid misalignments of the light beam.

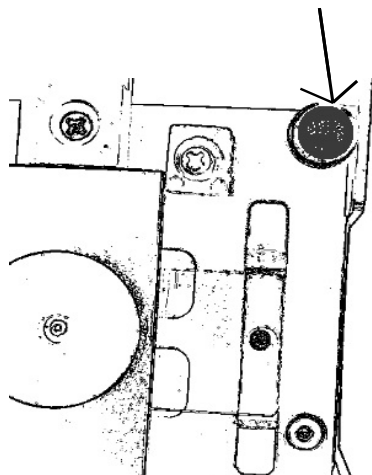


OTHER USEFUL COMPONENTS

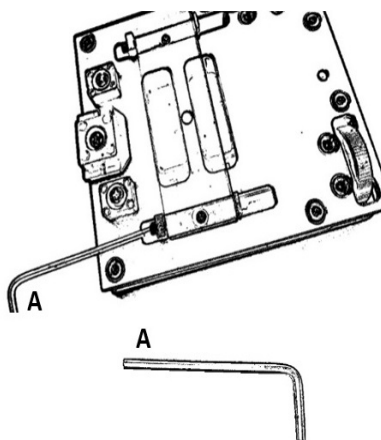


Use this frame when the highest step of the central block of the stage is not enough. Place it under the three blocks; you have to release the three screws, one for each block, and slip this frame under the blocks. Tight the blocks again with the lens in position, in order to improve its stability.

Use it for example to see thick samples, both in reflected or transmitted light modes.



A DIN464 screw can be used as an extra support to place your phone in a stable and horizontal position. A piece of thin, anti-slip material (inside the little bag with the screws) should be applied on it. For its use, remove the screw (with hexagonal, countersunk head) near the corner of the stage like in the sketch using the provided allen key and insert the DIN464 screw in its place. Change its height according to the needs.



(FOR KITS WITH FINE STAGE)
Use the little Allen key to reduce the clearance of the glass slide in its holders, if needed. Do not tight the glass slide, if you want to move it along the perpendicular axis.



Bright-field illumination
(with iPhone Pro)



Polarized light
and reflected light



Reflected light
out of the box



Polarizing filter
in the torch



Assembly of
supporting arm

TIP - light sources

Flashlights use more energy than the light source inside the black box. Therefore, for bright-field microscopy the light source in the box is preferable. For the same reason, we suggest to use re-chargable AAA batteries for the flashlight(s).

For reflected light illumination, Silver and Red lenses provide the best results. The Black lens works better in bright-field.

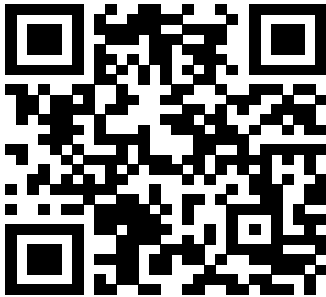
TIP - Black lens

Do not start your first tests using the black lens. This powerful lens is suitable to see very thin samples and the slide must be prepared with care. Do not use it with concave slides.

The black lens is suitable to see very thin and flat samples: bacteria, cells, pollens, spores and other subjects of this size. For wet samples, take care to use a very small drop under the coverslip, or dry the exceeding water; otherwise, you can also use the lens immersed in water (placed directly on the drop). Clean it with blotting paper after the use in water immersion.

Extremely powerful, with minimal footprint.

Patented



www.smartmicrooptics.com

DIPLE®

is a SMO's Registered Trademark

SmartMicroOptics srl

info@smartmicrooptics.com

via Reale 203b, 48123 Ravenna - Italy

WARNING

- **INGESTION HAZARD:** This product contains a button cell or coin battery.
- **DEATH** or serious injury can occur if ingested.
- A swallowed button cell or coin battery can cause **Internal Chemical Burns** in as little as **2 hours**.
- **KEEP** new and used batteries **OUT OF REACH of CHILDREN**
- **Seek immediate medical attention** if a battery is suspected to be swallowed or inserted inside any part of the body.



WARNING:
CHOKING HAZARD - Small parts.
Not for children under 3 years.