# IOP | User manual

Angénieux®

IOP user manual V1.28

# MISCELLANEOUS



Before using the products described in this manual, be sure to read and understand all respective instructions. This instruction manual applies to all Optimo Prime lenses and IOP tooling set. Please also refer to Optimo Prime lenses user manual available on our website: https://www.angenieux.com/service-and-support/#downloads

Tutorial video: https://www.youtube.com/watch?v=L1WqxZaC5hQ
Or scan the QR code:

# FOREWORD

Congratulations on the purchase of Angénieux Optimo Prime lenses and IOP tooling set. After 50 years almost fully dedicated to high-end zoom lens design and production, Angénieux chose the Cannes Film Festival to announce a complete set of high-end Full Frame Prime lenses – the Optimo Prime series, in partnership with Band Pro Film & Digital, Inc and Jebsen Industrial Technology Co LTD.

The Optimo Prime series of 12 lenses provides full frame 46.3mm image circle coverage with a consistent 1.8 T-stop for most of the lenses. To match with the legacy Optimo zooms, all Optimo Primes have identical colorimetry. Available with PL mount the Optimo Primes are the perfect companion for your digital camera. They can also be configured with LPL mount as an option.

**IMPORTANT:** Please be aware that Optimo Prime lenses won't fit on a camera with a reflex view finder.

All lenses support Cooke/i and are ARRI LDS2 ready; and offer a common gear size and position for all lenses in the 12-lens set.

The Optimo Prime series is composed of a total of 12 focal lengths with 18mm, 21mm, 24mm, 28mm, 32mm, 40mm, 50mm, 60mm, 75mm, 100mm, 135mm and 200mm.

Last but not least we allow you to go further than the standard Optimo Prime configuration to serve your creativity by using our unique Integrated Optical Palette (IOP) technology. This includes three methods to achieve your own personalized look with iris blade unit for different bokeh (including anamorphic effect), internal optical element and rear optical filter.

This user manual describes the different configurations and uses of your Optimo Prime IOP tooling set. If you need additional information don't hesitate to contact us at angenieuxservice@fr.thalesgroup.com. Additional product documentation is available on the Angénieux website at the service and support page: https://www.angenieux.com/service-and-support/.

# INFINITE POSSIBILITIES WITH IOP (INTEGRATED OPTICAL PALETTE)

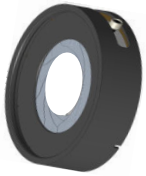
**OPTIMO PRIME SERIES**


**IOP internal filter (afocal area)**

Diffusion, vintage look, flares…

**IOP Iris sub assembly**

Various blade options

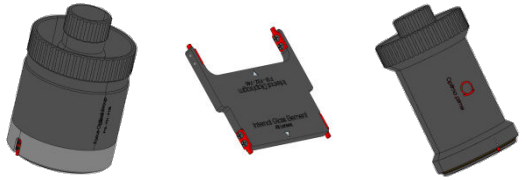


**IOP Rear filter**

Diffusion, vintage look, …

**IOP Tooling set**

To access to all internal IOP elements



# IOP ELEMENTS

In the below table you will find all the available references of IOP elements.

| REFERENCE | INTERNAL OPTICAL PALETTE ELEMENTS FOR OPTIMO PRIMES |
|---|---|
| 66067558AA | IOP TOOLING SET |
| 66066980AA | 3 Blades Iris D26i for F18, F21(Red IOP pin with ‘3’ engraved => 66067529AC) |
| 66066978AA | 3 Blades Iris D38 for F28, F40, F100, F135,F200 (Red IOP pin with ‘3’ engraved => 66067529AC) |
| 66066979AA | 3 Blades Iris D38i for F24,F32, F50, F60,F75 (Red IOP pin with ‘3’ engraved => 66067529AC) |
| 66068663AA | Oval Iris D26i for F18, F21 (Red IOP pin with ‘0’ engraved => 66067529AB) |
| 66068661AA | Oval Iris D38 F28, F40, F100, F135,F200 (Red IOP pin with ‘0’ engraved => 66067529AB) |
| 66068662AA | Oval Iris D38i for F24,F32, F50, F60,F75 (Red IOP pin with ‘0’ engraved => 66067529AB) |
| 66068016AA | Clear Optic (different from standard internal glass 66068698AA mounted in the product) |
| 66067549AA | Uncoated (Red IOP pin with ‘’UCM’ engraved => 66067529AF) |
| 66068076AA | Blue Streak optic (Red IOP pin with ‘’BSM’ engraved => 66067529AG) |
| 66068672AA | Net optic (Red IOP pin with ‘’NETM’ engraved => 66067529AK) |
| 66070875AA | Glimmer Glass 1/8 |
| 66070876AA | Black Satin 1/8 |
| 66070877AA | Black Pro Mist 1/8 |
| 66070878AA | Low Contrast 1/8 |
| 66069063AA | Vintage type (40.5mm REAR FILTER / Red IOP pin with ‘SVG’ engraved => 66067529AL) |
| 66066521AC | Red IOP pin with without engraving |
| 66067529AE | Red IOP pin with ‘9’ engraved |
| 66067528AA | White IOP pin without engraving |

# CONTENTS

**CAUTION**

Always follow these guidelines to ensure against injury to yourself or others and damage to the system or other objects.

- This safety information comes in addition to the product specific operating instructions in general and must be strictly observed for safety reasons.
- Read and understand all safety and operating instructions before you operate or install the lens.
- Do not use accessories or attachments that are not recommended by Angénieux, as they may cause hazards and invalidate the warranty.
- Do not attempt to repair any part of the system! Repairs must only be carried out by authorized Angénieux Service Centers.
- Do always use a clean area to open any Optimo Prime lenses to prevent from dust pollution.
- Do always perform IOP elements swapping using only the IOP spanners.

**WARNINGS**

- Handle any lens with care.
- Do not expose lens to water or moisture.
- Do not subject the lens to shocks.
- Never insert objects of any kind into any part of the lens if these are not clearly qualified for the task in the manual.
- Do not remove screws locked by varnish.
- Changing camera lenses should be done in a dry and dust-free environment. If this is not possible, take extra care that no dust enters the camera while the lens is off.
- Keep the protective caps on the lens when not set on camera or not in operation.
- Follow the cleaning instructions in this manual to avoid damage of the lens.
- Do not look at high intensity light directly through any lens.

## STORAGE CONDITIONS

- Store any lens in a dry place where the temperature does not exceed –40°C and +70°C (- 40°F and + 158°F).
- Do not store the lens in places where it may be subject to extreme temperatures, direct sunlight, high humidity, severe vibration, or strong magnetic fields.
- Condensation: When moving the lens from a cold to a warm location or when the lens is used in a damp environment, condensation may appear on glass surfaces and on internal or external electrical connections. Operating the lenses while condensation is present may result in damage to the equipment. Condensation on the optical components may have a visible effect on the output images. To prevent condensation, store the lens in a dry area. If the lens is in a humid area, dry it and store it a plastic bag with desiccant before using it. After moving the lens from cold to warm and humid environment, wait for some time for the lens to warm up to the ambient temperature to avoid condensation.

## TEMPERATURE OF OPERATION

- Any lens is designed to be used between - 20°C and + 45°C (- 4°F and + 113°F).
- The opto-mechanical design is passively athermalized. It allows Optimo Primes to prevent from a back focus shift with temperature changes.

## RECYCLING AND ENVIRONMENT

- Optimo Prime series and IOP tooling set are free of chemical substances covered by European Regulation REACH in excess of the thresholds set out. Follow the guidance sets up by your local authority for recycling the Optimo Prime lenses or the IOP tooling set.

# 1 - IOP TOOLING SET - WHAT'S IN THE BOX?


5 spanners, 2 optical element holders, extra screws

and extra pins all within a dedicated transport case

In case you require any assistance or noticed a missing or broken item please contact our service team at: angenieuxservice@fr.thalesgroup.com

# 2 - GENERAL LENS IOP CONFIGURATION

| Focal length | 18 mm | 21 mm | 24 mm | 28 mm | 32 mm | 40 mm | 50 mm | 60 mm | 75 mm | 100 mm | 135 mm | 200 mm |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Front ring | 4 screws | 8 screws | 8 screws | 8 screws | SPANNER 66067078AA | SPANNER 66067078AA | SPANNER 66067078AA | SPANNER 66067078AA | SPANNER 66067078AA | SPANNER 66067078AA | SPANNER 66067078AA | - |
| Front engraved ring | 4 screws | 4 screws (1) | 4 screws (1) | 4 screws (1) | 6 screws (1) | 6 screws (1) | 6 screws (1) | 6 screws (1) | 6 screws (1) | 6 screws (1) | 4 screws | 4 screws |
| Front group (Holder 66067062AA) | 8 screws | 8 screws | 8 screws and SPANNER 66067102AA | 8 screws and SPANNER 66067102AA | 6 screws and SPANNER 66067102AA | 6 screws and SPANNER 66067102AA | 6 screws and SPANNER 66067102AA | 6 screws and SPANNER 66067102AA | 6 screws and SPANNER 66067102AA | 6 screws and SPANNER 66067102AA | 8 screws | - |
| Focus group (Holder 66067075AA) | Spanner 66067115AA | Spanner 66067115AA | - | - | - | - | - | - | - | - | Spanner 66067115AA | Internal and external part of spanner 66067121AA |
| Internal glass barrel retainer | External part of spanner 66067121AA | External part of Spanner 66067121AA | External part of spanner 66067121AA | External part of spanner 66067121AA | External part of spanner 66067121AA | External part of spanner 66067121AA | External part of spanner 66067121AA | External part of spanner 66067121AA | External part of spanner 66067121AA | External part of spanner 66067121AA | External part of spanner 66067121AA | External part of spanner 66067121AA |
| Internal glass barrel | Internal part of spanner 66067121AA | Internal part of spanner 66067121AA | Internal part of spanner 66067121AA | Internal part of spanner 66067121AA | Internal part of spanner 66067121AA | Internal part of spanner 66067121AA | Internal part of spanner 66067121AA | Internal part of spanner 66067121AA | Internal part of spanner 66067121AA | Internal part of spanner 66067121AA | Internal part of spanner 66067121AA | Internal part of spanner 66067121AA |
| Internal diaphragm | Large side of spanner 66066961AA | - | - | - | Large side of spanner 66066961AA | Large side of spanner 66066961AA | - | - | - | - | - | - |
| Internal glass element | Small side of spanner 66066961AA | Small side of spanner 66066961AA | Small side of spanner 66066961AA | Small side of spanner 66066961AA | Small side of spanner 66066961AA | Small side of spanner 66066961AA | Small side of spanner 66066961AA | Small side of spanner 66066961AA | Small side of spanner 66066961AA | Small side of spanner 66066961AA | Small side of spanner 66066961AA | Small side of spanner 66066961AA |
| Iris sub-assembly | Internal part of spanner 66067121AA | Internal part of spanner 66067121AA | Internal part of spanner 66067121AA | Internal part of spanner 66067121AA | Internal part of spanner 66067121AA | Internal part of spanner 66067121AA | Internal part of spanner 66067121AA | Internal part of spanner 66067121AA | Internal part of spanner 66067121AA | Internal part of spanner 66067121AA | Internal part of spanner 66067121AA | Internal part of spanner 66067121AA |

(1) : NOT MANDATORY TO REMOVE BUT EASE THE FRONT GROUP SCREWS ACCESSIBILITY AND FRONT GROUP REMOVING

# 3 - GENERAL IOP ELEMENT SWAPPING PROCEDURE

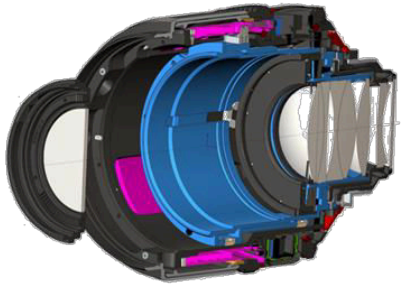
**Step 1**

Front ring removal

**Step 2**

Front group removal
+ Focus group removal for F18-F21-F135

**Step 3**



Internal glass element
And iris removal

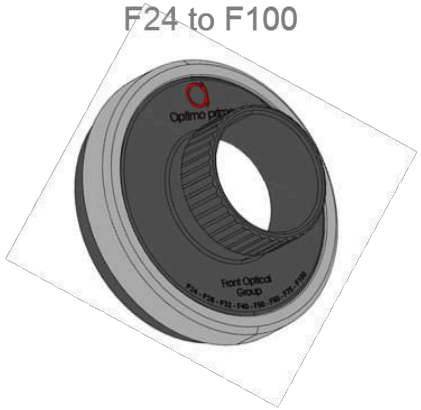
## NECESSARY TOOLS

Front ring spanner
F32 to F135

Or Philipps screwdriver
F18 to F28

Philipps screwdriver
F18 to F28

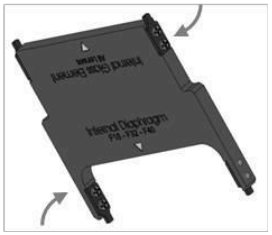
And front group spanner
F24 to F100



And Focus group spanner
Only for F18-F21-F135

IOP element spanner

And Internal glass side



And Internal diaphram side
F18-F32-F40



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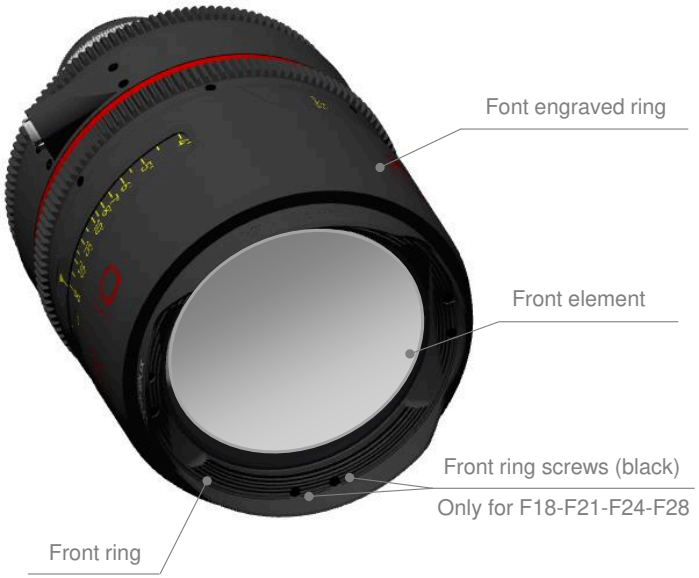
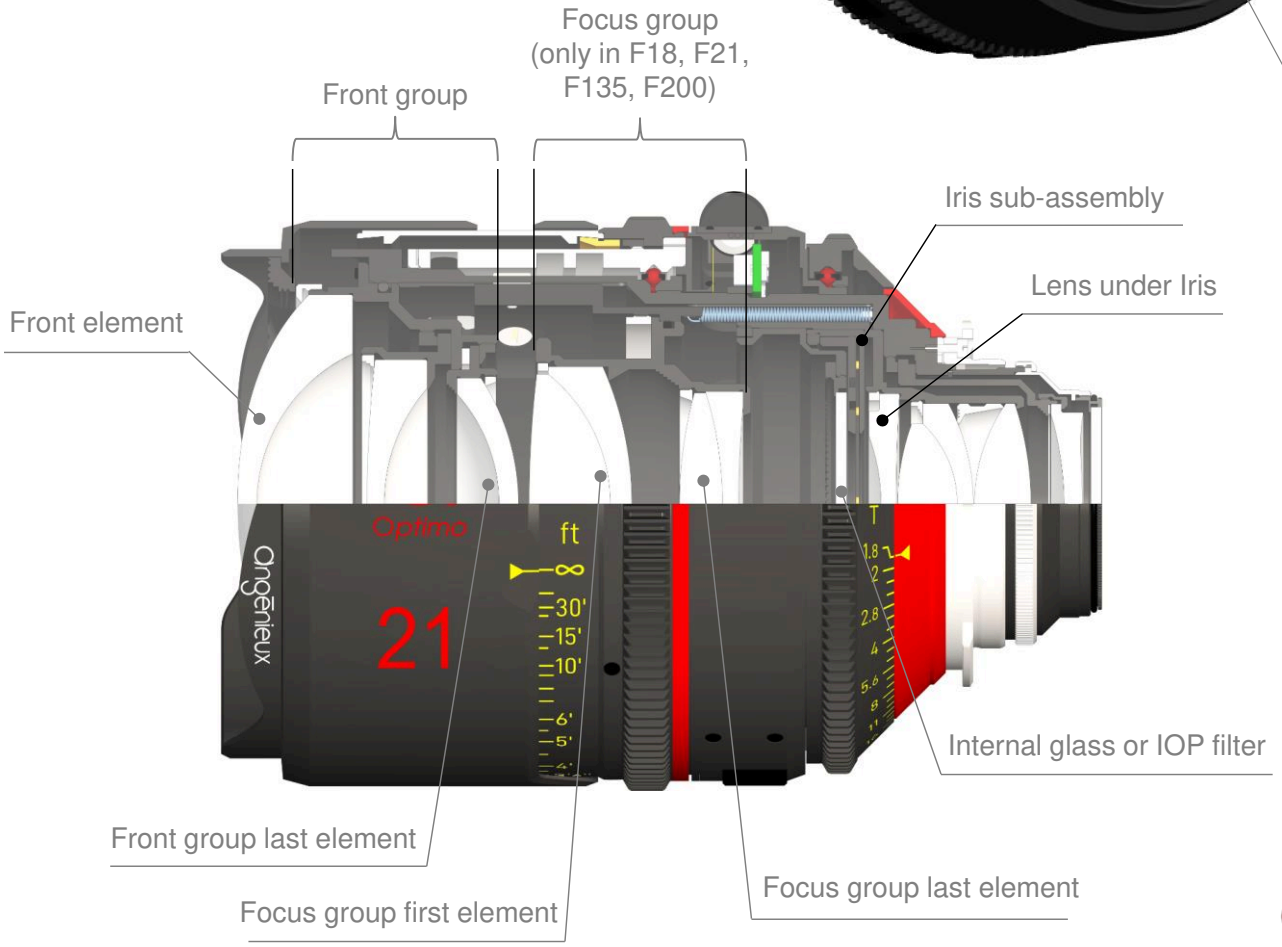

Font engraved ring
Front element
Front ring screws (black)
Only for F18-F21-F24-F28
Front ring


Front group screw (black)
Front engraved ring screw (silver)
Front group screws


Front group
Focus group
(only in F18, F21,
F135, F200)
Iris sub-assembly
Lens under Iris
Front element
Internal glass or IOP filter
Front group last element
Focus group first element
Focus group last element
Optimo
ft
21
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# 4 - SPARE PARTS AND OPTIONAL ACCESSORIES

| COMMON SPARE PARTS | |
|---|---|
| IOP tooling set | 66067558AA |
| Front ring spanner – only for F32, F40, F50, F60, F75, F100, F135 | 66067078AA(1) (pins fixed with long screws 0981997) |
| Front group spanner – only for F24, F28, F32, F40, F50, F60, F75, F100 | 66067102AA(1) |
| Front group holder | 66067062AA(1) |
| Focus group spanner – only for F18, F21, F135 | 66067115AA(1) ( pins fixed with short screws 0982007) |
| Focus group holder – only for F18, F21, F135 | 66067075AA(1) |
| IOP element spanner | 66067121AA(1) ( pins fixed with short screws 0982007) |
| Internal glass and IOP filter flat spanner | 66066961AA(1) ( pins fixed with both short and long screws 0982007 and 0981997) |
| Focus group retainer – only for F18, F21, F135 | 400006353 |
| Internal glass filter | 66068698AA |
| IOP filter retainer | 400002896 |
| Screws for spanners pins | 0981997 (long) and 0982007 (short) |
| Spanner Pins | 66067081AA |
| Front ring and front group locating pin | 400006541 |
| Focus group and iris sub-assembly locating pin | 400002943 |
| Screws for front ring - only for F18 (x4), F21 (x8), F24 (x8), F28 (x8) | 0982137 |
| Screws for front engraved ring | 33-000072<br>0982117 for F 200 |
| Screws for front group | 0982117 for F21, F32, F40, F50, F60<br>0982137 for F18, F24, F28, F75, F135<br>33-000045 for F100 |

(1) Reference is for internal use only

| SPECIFIC SPARE PARTS | F18 | F21 | F24 | F28 | F32 | F40 | F50 | F60 | F75 | F100 | F135 | F200 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Font ring | 400005236 | 400005165 | 400006623 | 400005012 | 400004602 | 400002944 | 400003584 | 400003584 | 400003584 | 400004816 | 400002685 | - |
| Front engraved ring | 400004912 | 400003741 | 400006622 | 400003498 | 400004579 | 400001887 | 400003490 | 400005039 | 400004624 | 400002521 | 400002487 | 400006287 |
| Front element | 324981 | 324767 | 66066951AA | 324766 | 324739 | 323806 | 324696 | 66066234AA | 324648 | 66066449AA | 324482 | 66066925AA |
| Front group last element | 324983 | 324534 | 66066970AA | 323945 | 324743 | 323810 | 324692 | 66066243AA | 324655 | 66066463AA | 324471 | 66066932AA |
| Focus group first element | 324976 | 324536 | - | - | - | - | - | - | - | - | 324485 | 66066932AA |
| Focus group last element | 324977 | 324543 | - | - | - | - | - | - | - | - | 324485 | 66066932AA |
| Internal diaphragm | 400005179 | - | - | - | 400004672 | 400002708 | - | - | - | - | - | - |
| Internal glass barrel | 400004674 | 400003568 | 400003568 | 400002913 | 400004674 | 400002837 | 400003568 | 400003568 | 400004678 | 400004807 | 400002913 | - |
| Standard Iris sub-assembly 9 blades | 400003742 | 400003742 | 400004599 | 400004412 | 400004599 | 400004412 | 400004599 | 400004599 | 400004599 | 400004412 | 400004412 | 400004412 |
| Lens under Iris | 324978 | 324545 | 66066971 | 323947 | 324854 | 323818 | 324693 | 66066245 | 324644 | 66066454 | 324478 | 66066944AA |

# 5 - IOP ELEMENT SWAP

## ADDITIONAL TOOLS

In addition to your IOP tooling set you will need a Phillips screwdriver to remove the front ring, front engraved ring and front optical group holding screws. As an example we are using in factory the Phillips screwdriver WERA 345290 PH000. You will need also a pair of tweezers to pick accurately the screws you are removing to prevent from any damage or screw drop.

**CAUTION:** as you are opening the product, this operation must be done with cautious in a clean and dry environment to prevent dust or particles pollution inside the lens. We advise you to wear adapted gloves to leave no traces on the optical elements and mechanics.

**CAUTION:** when you are removing the screws holding the front ring or the front group, be cautious to secure the screws removing using a pair of tweezers to prevent from any drop or damage. Remove with cautious the retainers using the hands and a pair of tweezers to prevent from any drop or damage.

**CAUTION:** before removing a ring, a retainer or an element, do always check the thread or element cleanliness. If necessary, clean the thread or mechanical element blowing dry air or using a soft brush. For optical elements, blow dry air and do always use a soft optical cloth and an isopropyl alcohol liquid starting with the center and cleaning by turning outwards.

**CAUTION:** when putting back the focus or front group, we recommend blowing dry air onto the two side lenses of the optical sub-assembly. Do not do this above the opened Optimo Prime lens to prevent from dust pollution. In case you need to clean a lens, do always use a soft optical cloth and an isopropyl alcohol liquid starting with the center and cleaning by turning outwards.

**CAUTION:** when putting back a retainer or a threaded front ring, check the thread cleanliness and clean the thread or mechanical element blowing dry air and using a soft brush. Do not do this above the opened Optimo Prime lens to prevent from dust pollution. To be sure the thread fits perfectly, rotate the part you are putting back counterclockwise with the hands or a pair of tweezers so it falls in the correct thread position before tightening it. Do not apply any strong torque and check if the element is rotating easily before tightening clockwise. You may put in the thread a very small amount of mechanical grease all around if you note some mechanical friction.

**CAUTION:** be cautious to handle all the elements you are removing or putting back with a maximum care. Do always respect the pin orientation on the elements you are putting back when there is one.

**CAUTION:** never use strong torque to tighten or untighten an element with any spanner. If you apply too much torque the spanner pins may break. If so this is not normal and either you applied too much torque than necessary or your lens may have been damaged or modified by someone. You have extra pins for replacement in those cases but we recommend contacting your local reseller or our service team at angenieuxservice@fr.thalesgroup.com.

**IMPORTANT:** do always use the dedicated Angenieux IOP spanners provided in the IOP tooling set and never use excessive torque to tighten the retainers, rings or screws. In case you require assistance or have any doubt doing an IOP element swapping and before damaging something, please contact your local reseller or our service team at angenieuxservice@fr.thalesgroup.com.

## STEP 1: REMOVE THE FRONT RING

THE BELOW PROCEDURE APPLIES FOR F18, F21, F24, F28:

0 - Remove the front cap.

1 - Untighten the front ring screws with an adapted size Phillips screwdriver.

2 - Remove one by one each screws with cautious and securely using a pair of tweezers.

3 - Remove the front ring with the hands or a pair of tweezers.

**TIP:** after removing the screws you can also take off the front ring by maintaining it and flipping the Optimo Prime upside down and catch the front ring with the hands. Do not hold the lens by the rear cap.

1

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THE BELOW PROCEDURE APPLIES FOR F32, F40, F50, F60, F75, F100, F135:

0 - Remove the front cap.

1 - Put in position the front ring spanner 66067078AA by rotating it left or right so the two pins fit perfectly with the front ring holes.

2 - Untighten the front ring with the front ring spanner.

3 - Remove the spanner.

4 - Remove the front ring with the hands or a pair of tweezers.

**TIP:** if the front ring is not totally untightened you can finish untightening it with the hands or a pair of tweezers. You can also take off the front ring by flipping the Optimo Prime upside down and catch the front ring with the hands. Do not hold the lens by the rear cap.


1


2


4 - by hands from the front or upside down

## STEP 2: REMOVE THE FRONT ENGRAVED RING

This step is mandatory for F18, F135, F200.

**IMPORTANT:** even if for the rest of the Optimo Prime series this step is not mandatory, the front group and front group screws access is easier when the front engraved ring is removed. See below the two pictures on the right showing the front group screws accessibility differences. We recommend removing the front engraved ring systematically to reduce risks of screw drop and secure the front group repositioning.

The below procedure applies for all Optimo Primes. Only the number of screws varies. Screws are silver Phillips type.

1 - Untighten the front engraved ring screws with an adapted size Phillipps screwdriver and remove them one by one with cautious and securely using a pair of tweezers.

2 - Pull out straightly the front engraved ring.

1


2

Front group screws access with and without front engraved ring

## STEP 3: REMOVE THE FRONT GROUP

THE BELOW PROCEDURE APPLIES FOR F24, F28, F32, F40, F50, F60, F75, F100

1 - Untighten and remove the front group screws one by one with cautious and securely using a pair of tweezers. Screws are black Phillips type.

2 - Put in position the front group spanner 66067102AA and rotate it counterclockwise so it falls in the correct thread position.

3 - Tighten the front group spanner up to the end-stop. Do not apply more torque after you reached the end-stop.

4 - Pull straightly the front group. As there is an o-ring around the front group mechanics you need to pull with enough force.

5 - Put in a secure area the front group with the spanner on onto the front group holder 66067062AA.

F50 Front group screws location

3

4

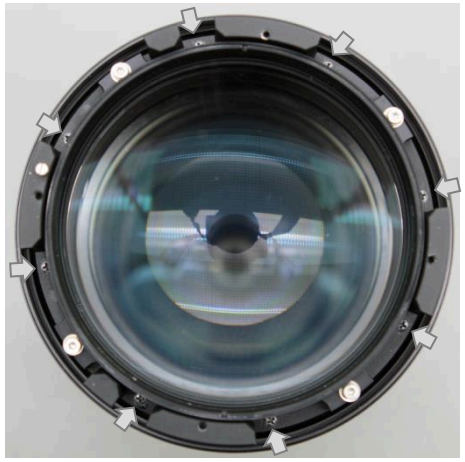
5

THE BELOW PROCEDURE APPLIES FOR F18, F21, F135

1 - Untighten and remove the front group screws one by one with cautious and securely using a pair of tweezers. Screws are black Phillips type.

F18 Front group screws location

F21 Front group screws location



F135 Front group screws location

2 - Pull straightly with cautious the front group with the hands. As there is an o-ring around the front group mechanics you need to pull with enough force.

A - For F18 and F135 you can easily pull the front group by hand by taking it by the front group barrel.

F18 front group removal by hand

F135 front group removal by hand

B - For F21, if it is one from the first delivered products, it is risky to pull directly the front group by the hands. You should use a plastic stick or plastic head tweezers to pull out the front group. Put it on one edge and lift up slightly the front group to release the o-ring. Take the front group and pull it out with the hands. If the F21 is a recent one, pull the group by hand like it is shown on the previous page.

F21 front group removal with the help of a plastic head tweezers and by hand

**POSSIBLE WITH CARE:** for F18, F21, F135 it is possible to use vacuum system with plastic suction head or a suction grip to pull the front group. Be aware that you must use those tools correctly to prevent from any drop or damage on the front element. Angenieux will not be responsible of any damage caused using this method. Do always clean properly the front element and the suction head before putting it in place.

3 - Put in a secure area the front group onto the front group holder 66067062AA. You can put a tissue on the front element to protect it from dust pollution.

## STEP 4: REMOVE THE FOCUS GROUP - ONLY FOR F18, F21, F135

THE BELOW PROCEDURE APPLIES FOR F18, F21, F135

1 - Put in position the internal part of the focus group spanner 66067115AA and rotate it counterclockwise so it falls in the correct thread position.

2 - Tighten the internal part of the spanner up to the end-stop. Do not apply more torque after you reached the end-stop.

3 - Put in position the external part of the focus group spanner and rotate it left or right so the two pins fit perfectly with the retainer holes.

4 - Untighten the focus group retainer with the external part of the focus group spanner.

5 - Pull straightly the focus group by the internal part of the focus group spanner. As there is an o-ring around the focus group mechanics you need to pull with enough force. The focus group and the retainer will come out with the spanner.

6 - Put in a secure area the focus group with the spanner on onto the focus group holder 66067075AA.

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## STEP 5: REMOVE INTERNAL GLASS ELEMENT OR IOP FILTER

THE BELOW PROCEDURE APPLIES FOR ALL OPTIMO PRIMES

1 - Put in position the internal part of the IOP element spanner 66067121AA and rotate it counterclockwise so it falls in the correct thread position.

2 - Tighten the internal part of the spanner up to the end-stop. Do not apply more torque after you reached the end-stop.

3 - Put in position the external part of the IOP element spanner and rotate it left or right so the two pins fit perfectly with the retainer holes.

4 - Untighten the internal glass barrel retainer.

5 - Pull out straightly by the internal part of the IOP element spanner. The internal glass barrel and the retainer will come out with the spanner.

6 - Untighten and remove the internal glass barrel from the internal part of the IOP element spanner.

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4

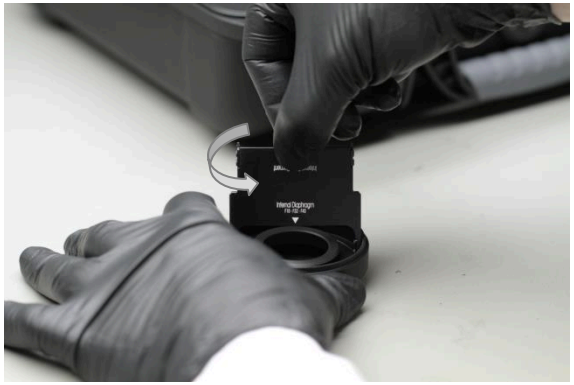
5

6

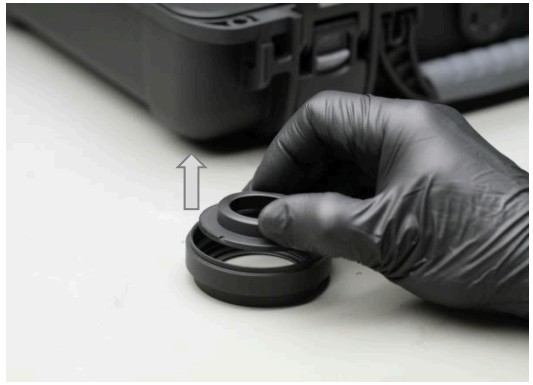
STEPS 7.1 AND 7.2 APPLY ONLY FOR F18, F32, F40

7.1 - Put the internal glass barrel on a flat surface. Put the spanner 66066961AA in position where ‘Internal Diaphragm’ engraving can be read.

7.2 - Untighten and remove the internal diaphragm.



7.1



7.2

8 - Put the spanner 66066961AA in position where ‘Internal Glass Element’ engraving can be read.

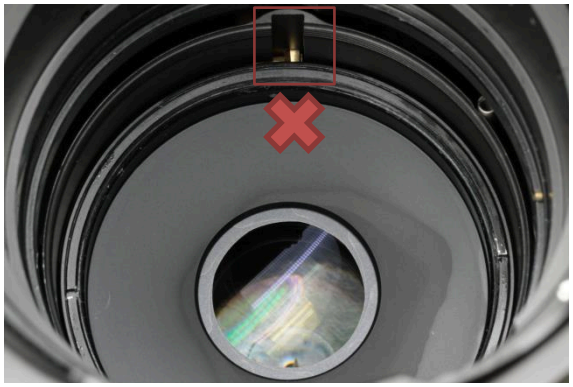
9 - Untighten and remove the internal glass element or IOP filter.

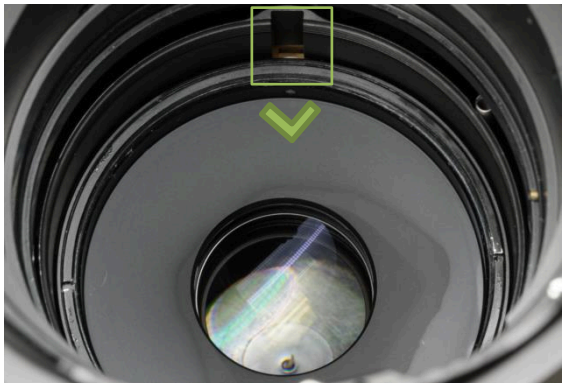
8

9

## STEP 6: REMOVE THE IRIS SUB-ASSEMBLY

1 - Open the iris thus the iris sub-assembly guiding pin is free to go out.





2 - Put the internal part of the IOP element spanner 66067121AA and rotate it counterclockwise so it falls in the correct thread position.

3 - Tighten the internal part of the spanner up to the end-stop. Do not apply more torque after you reached the end-stop.

4 - Pull out straightly the IOP element spanner. The iris sub-assembly will come out with the spanner.

5 - Untighten and remove the iris sub-assembly from the internal part of the IOP element spanner.

3

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# 6 - REASSEMBLING

**IMPORTANT:** before installing any optical element, clean each surface properly. Blow dry air and do always use a soft optical cloth and an isopropyl alcohol liquid starting with the center and cleaning by turning outwards. Before installing any ring or retainer, clean the thread and surface properly. Blow dry air and do always use a soft cloth or a soft brush to remove dust.

**CAUTION:** when reassembling optical groups with an outside o-ring, do always check if the o-ring is enough greased. If not, apply a small amount of mechanical grease around the o-ring so the optical group will fall in place correctly.

**CAUTION:** if you detect any damage on a retainer or screws (head or thread), don't hesitate to replace them instead of reassembling the lens with damaged parts. It will secure future IOP swaps.

**CAUTION:** when reassembling retainers, do always check if the thread is clean and apply a very small amount of mechanical grease in the thread so the retainer will go gently in the mechanical thread.

**CAUTION:** reassemble each element with a lot of cautious to prevent from any damage. Do always check each element and mechanical functioning after each step.

**CAUTION:** avoid blowing air above or within the open mechanics to prevent from dust pollution. If you note a dust pollution on an optical element that has been reassembled, it is recommended to disassemble, clean and reassemble the element.

**CAUTION:** before installing any IOP internal filter, do always clean it properly. Blow dry air and do always use a soft optical cloth and an isopropyl alcohol liquid starting with the center and cleaning by turning outwards.

**CAUTION:** before installing any iris sub-assembly, do always check its functioning by moving back and forth the iris pin. The torque should be even and the lightest possible. There should not be any mechanical friction.

**CAUTION:** never use strong torque to tighten or untighten an element with any spanner. If you apply too much torque, the spanner pins may break. If so, this is not normal and either you applied too much torque than necessary or your lens has been damaged or modified by someone. In the IOP tooling set, you have extra pins for replacement but we recommend contacting your local reseller or our service team at angenieuxservice@fr.thalesgroup.com to be sure you have no issue with your lens.

**IMPORTANT:** do always use the dedicated Angenieux IOP spanners provided in the IOP tooling set and never use excessive torque to tighten the retainers, rings or screws. In case you require assistance or have any doubt doing an IOP element swapping and before damaging something, please contact your local reseller or our service team at angenieuxservice@fr.thalesgroup.com.

## STEP 1: IRIS SUB-ASSEMBLY

THE BELOW PROCEDURE APPLIES FOR ALL OPTIMO PRIMES

0 - Put the iris ring at the maximum opened T-stop position.

1 - Mount the iris sub-assembly onto the internal part of the IOP element spanner 66067121AA. First, rotate the iris-subassembly counterclockwise so it falls in the correct thread position.

2 - Tighten the iris sub-assembly up to the end-stop. Do not apply more torque after you reached the end-stop.

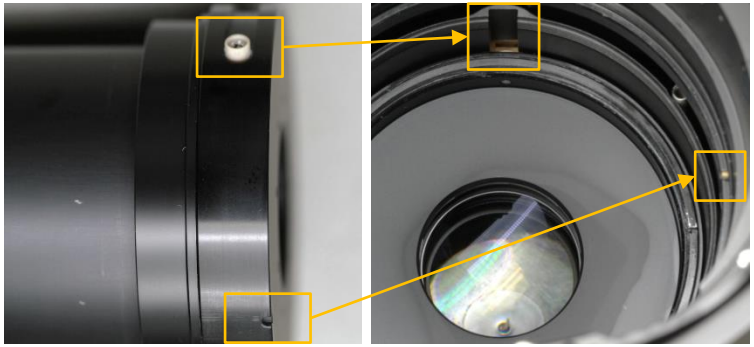
3 - Align the locating hole of the iris sub-assembly with the internal iris locating pin. Align the iris pin with the internal iris hole.

4 - Put the iris-sub-assembly back in the lens by sliding straightly the internal part of the IOP element spanner.

5 - Untighten and pull out the internal part of the IOP element spanner.

6 - Keeping the lens vertically, check that the iris is functioning correctly by rotating the iris gear. The iris blades should close and open correctly and the iris sub-assembly should not move.

2



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## STEP 2: INTERNAL GLASS ELEMENT OR IOP FILTER

THE BELOW PROCEDURE APPLIES FOR ALL OPTIMO PRIMES

0 - Before putting back IOP filter or internal glass element check the optical element cleanliness. If necessary, blow dry air and clean it properly.

1 - Put the IOP filter or internal glass element in the barrel. The pin holes of the IOP filter or internal glass element must be on top.

2 - Put the spanner 66066961AA in position where 'Internal Glass Element' engraving can be read. Rotate counterclockwise so the IOP filter or internal glass element falls in the correct thread position. Tighten the IOP filter or internal glass element. Do not apply high torque and tighten the retainer just in contact.

1

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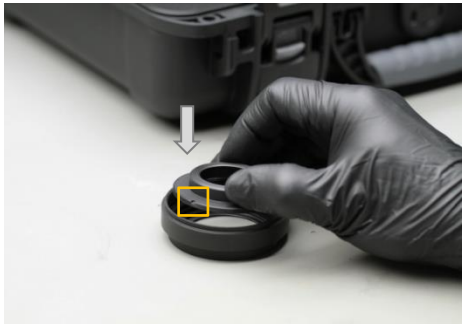
STEPS 3.1 AND 3.2 APPLY ONLY FOR F18, F32, F40

3.1 - Put the internal diaphragm in the barrel. The pin holes of the internal diaphragm must be on top.

3.2 - Put the spanner 66066961AA in position where 'Internal Diaphragm' engraving can be read. Rotate counterclockwise so the internal diaphragm falls in the correct thread position. Tighten the internal diaphragm. Do not apply high torque and tighten the retainer just in contact.



3.1

3.2

THE BELOW PROCEDURE APPLIES FOR ALL OPTIMO PRIMES

4 - Mount the internal glass barrel onto the internal part of the IOP element spanner 66067121AA. First, rotate the barrel counterclockwise so it falls in the correct thread position.

5 - Tighten the internal glass barrel up to the end-stop. Do not apply more torque after you reached the end-stop.

6 - Put the retainer onto the barrel. Put the external part of the spanner 66067121AA so that the spanner pins are in the retainer pin holes.

7 - Put the barrel and retainer back in the lens by sliding straightly the spanner. Hold the spanner with the internal part of the spanner.

8 - Tighten the retainer with the external part of the spanner. Do not apply high torque and tighten the retainer just in contact.

9 - Untighten the internal part of the spanner and pull out the whole spanner by the internal part of the spanner.

10 - Check that the iris is functioning correctly by rotating the iris gear. The iris torque should be smooth and even. For F24, F28, F32, F40, F50, F60, F75, F100, check that the iris ring is not moving when you rotate the focus gear back and forth. If you face any issue release the barrel retainer and tighten it with less torque.

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## STEP 3: FOCUS GROUP - ONLY FOR F18, F21, F135

THE BELOW PROCEDURE APPLIES FOR F18, F21, F135

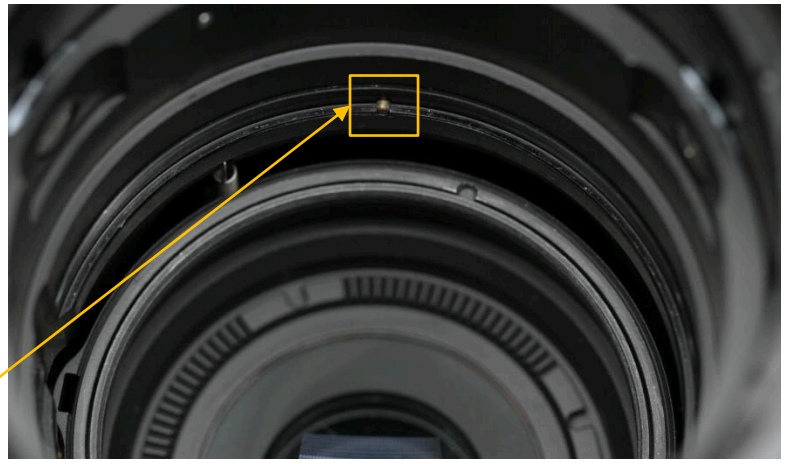
0 - Before putting back the focus group check the optical element cleanliness. If necessary, blow dry air and clean it properly.

1 - If you have removed the focus group from the focus group spanner 66067115AA, mount the focus group onto the internal part of the spanner. Rotate counterclockwise the focus group so it falls in the correct thread position. Tighten to the end-stop. Do not apply more torque after you reached the end-stop.

2 - Align the locating hole of the focus group with the internal focus group locating pin.

3 - Put the focus group back in the lens straightly only with the internal part of the focus group spanner.

4 - Push straightly on the spanner to secure the focus group with the o-ring.



2

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5 - With the hands, put gently the retainer on the focus group. The pin holes of the retainer must be on top.

6 - Put the external part of the focus group spanner 66067115AA. Rotate counterclockwise the external part of the spanner so the spanner pins are into the retainer pin holes. Continue to rotate counterclockwise the external part of the spanner so the retainer falls in the correct thread position.

7 - Tighten the retainer with the external part of the spanner. Do not apply high torque and tighten the retainer just in contact.

8 - Untighten the internal part of the spanner and pull out the whole spanner by the internal part of the spanner.

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## STEP 4: FRONT GROUP

THE BELOW PROCEDURE APPLIES FOR F24, F28, F32, F40, F50, F60, F75, F100

0 - Before putting back the front group check the optical element cleanliness. If necessary, blow dry air and clean it properly.

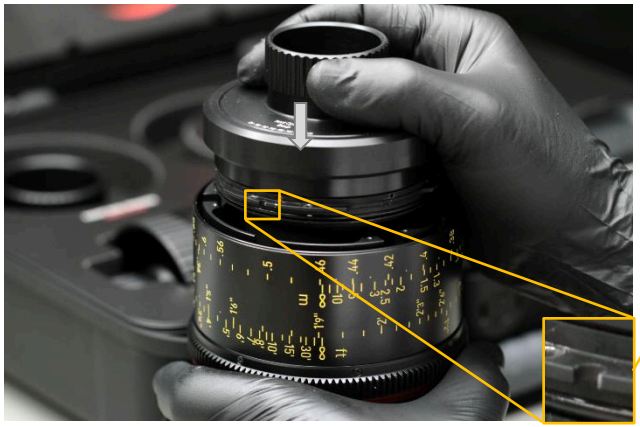
1 - If you have removed the front group from the front group spanner 66067102AA, mount the front group onto the spanner. Rotate counterclockwise the front group so it falls in the correct thread position. Tighten to the end-stop. Do not apply more torque after you reached the end-stop.

2 - Align the locating hole of the front group with the front group locating pin.

3 - Put the front group back in the lens straightly with the spanner.

4 - Push straightly on the spanner to secure the front group with the o-ring. Untighten and remove the spanner.

5 - Tighten all the front group screws. Do not apply high torque and tighten the screws just in contact.



2

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Front group screws location on F50

THE BELOW PROCEDURE APPLIES FOR F18, F21, F135

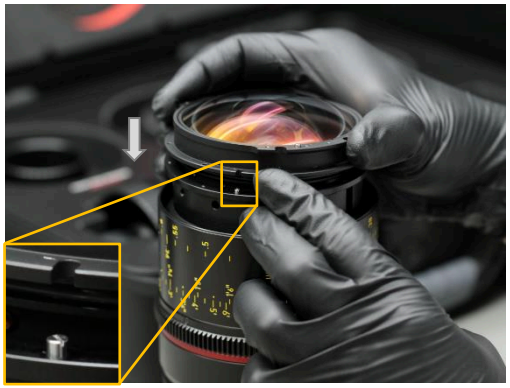
0 - Before putting back the front group check the optical element cleanliness. If necessary, blow dry air and clean it properly.

1 - Align the locating hole of the front group with the front group locating pin.

2 - Put the front group back in the lens straightly with the hand or with the help of a clean suction head.

3 - Push straightly the front group with the fingers to secure the front group with the o-ring.

4 - Tighten all the front group screws. Do not apply high torque and tighten the screws just in contact.



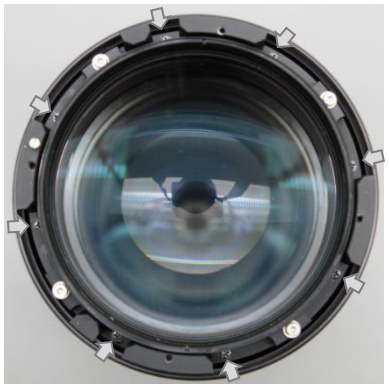
F18 Front group locating pin

F28 Front group locating pin

Step 3 for F28

F18 Front group screws location

F21 Front group screws location



F135 Front group screws location

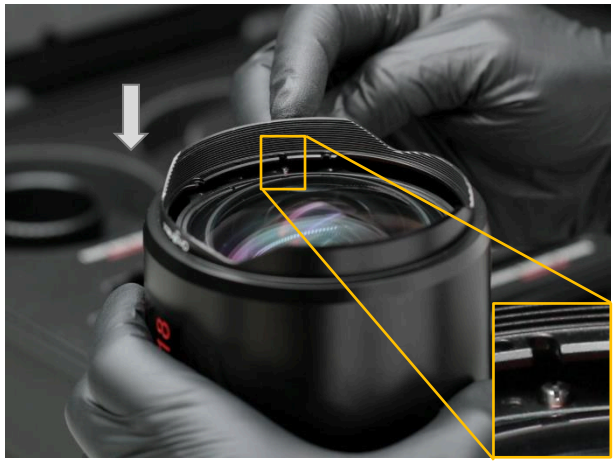
## STEP 5: FRONT ENGRAVED RING

0 - Before putting back the front engraved ring, check the inner cleanliness. If necessary, blow dry air and clean it properly.

1 - If any, align the locating hole of the front engraved ring with the front engraved ring locating pin.

2 - Slide straightly the front engraved ring.

3 - Tighten all the front engraved ring screws. Do not apply high torque and tighten the screws just in contact.



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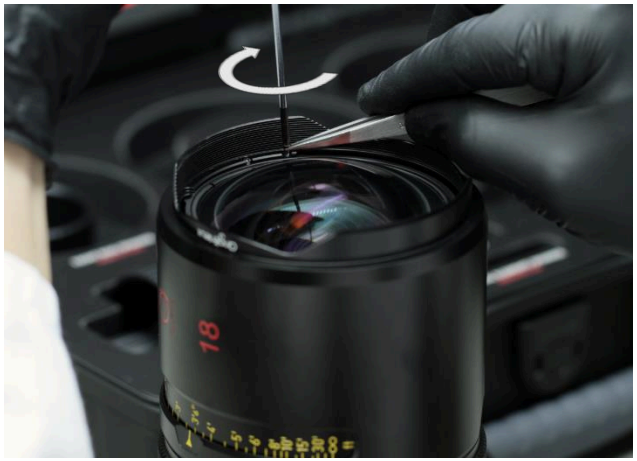


3

## STEP 6: FRONT RING

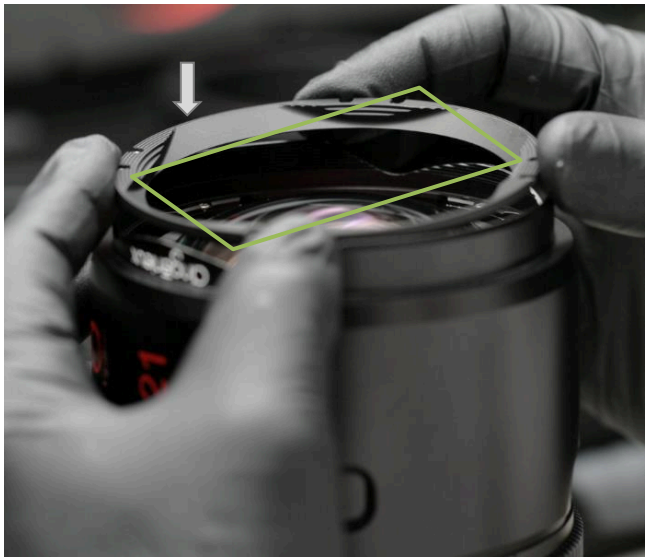
THE BELOW PROCEDURE APPLIES FOR F18, F21, F24, F28:

1 - With the hands, put the front ring in position with the largest mask shape towards the horizontal direction.

2 - Tighten all the front ring screws. Do not apply high torque and tighten the screws just in contact.

3 - Put the front cap with the spring button on the top of the lens towards the largest edge.

4 - You can have a drink and rest before the next one ☺.



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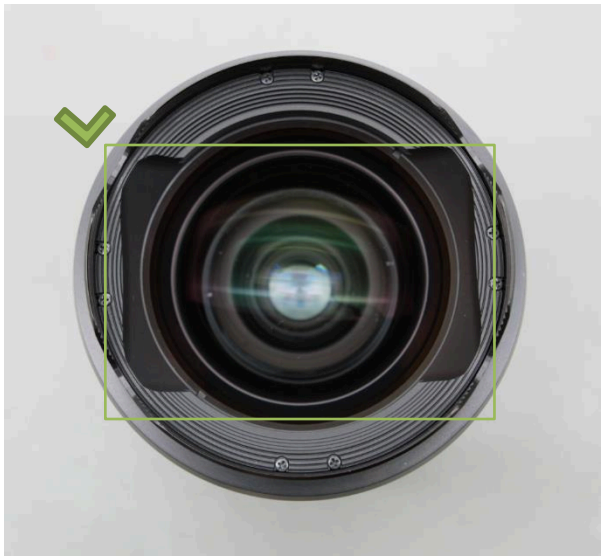

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THE BELOW PROCEDURE APPLIES FOR F32, F40, F50, F60, F75, F100, F135:

0 - Before putting back the front ring, check the thread cleanliness of the retainer. If necessary, blow dry air and clean it properly.

1 - With the hands, put the front ring in position.

2 - With the hands, rotate the front ring counterclockwise so it falls in the correct thread position.

3 - With the hands, tighten the front ring of a few threads.

4 - Put in position the front ring spanner 66067078AA and finish to tighten. Do not apply high torque and tighten the front ring just in contact.

5 - Put the front cap.

6 - You can have a drink and rest before the next one ☺.

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# 7 - F200 IOP COMPLETE PROCEDURE

Even if the general mechanical structure of the Optimo Prime F200 is similar to the other Optimo Primes, you will find in the next pages the dedicated F200 complete procedure for IOP elements swap. Please apply the same cautious and care described in the previous pages for disassembling and reassembling. You will find those information in section “5 - IOP ELEMENT SWAP” and in section “6 - REASSEMBLING”.

## STEP 1: REMOVE THE FRONT ENGRAVED RING

0 - Remove the front cap.

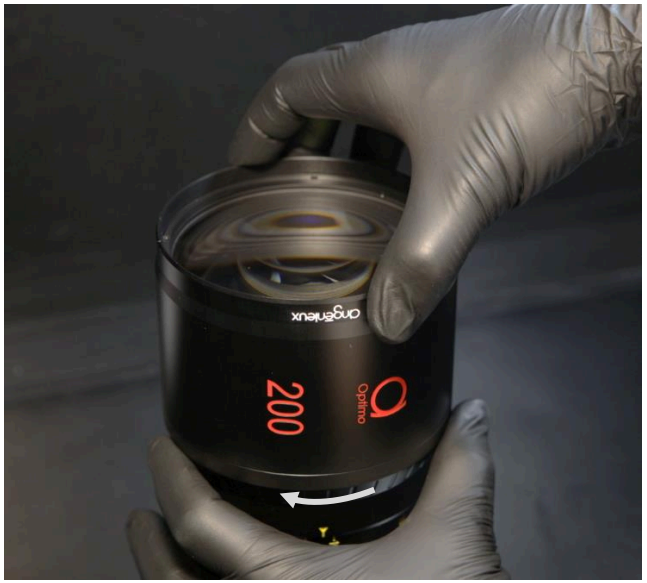
1 - Untighten the front engraved ring retainer with the hands. The front engraved ring retainer will fall by the rear of the lens and can remain like this during all the IOP swap steps. See on right picture below.

**CAUTION:** as this retainer thickness is thin, do not apply high pressure on the retainer to be able to untighten the retainer.

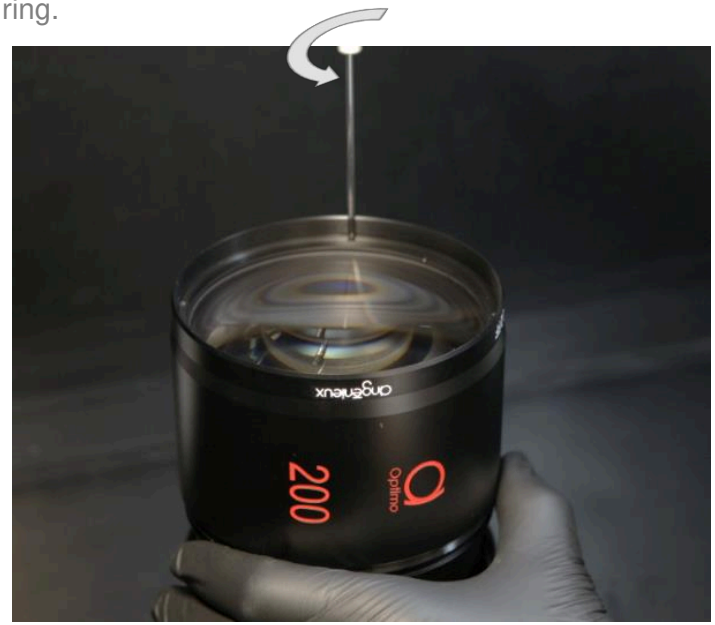
2 - Untighten the front ring screws with an adapted size Phillips screwdriver.

3 - Remove one by one each screws with cautious and securely using a pair of tweezers.

4 - Pull out straightly the front engraved ring.




1




2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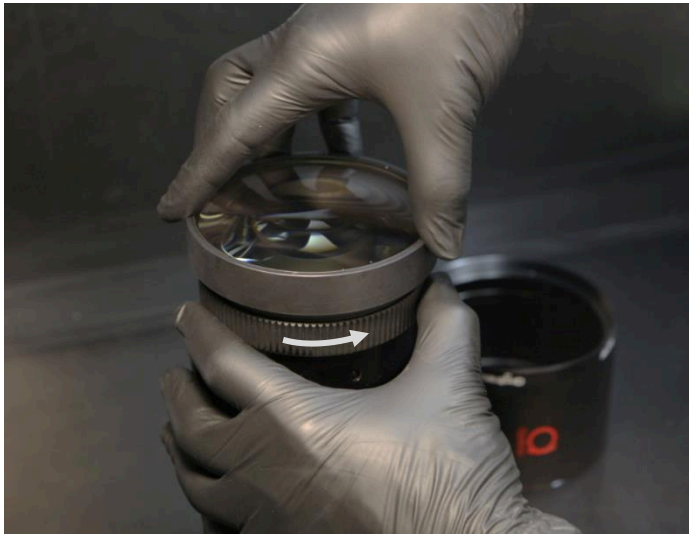
## STEP 2: REMOVE THE FRONT GROUP

1 - Untighten the front group retainer with the hands.

2 - Pull out straightly the front group.

3 - Put in a secure area the front group onto the front group holder 66067062AA. You can also put the front group upside down onto the front engraved ring. You can put a tissue on the optical element to protect it from dust pollution.



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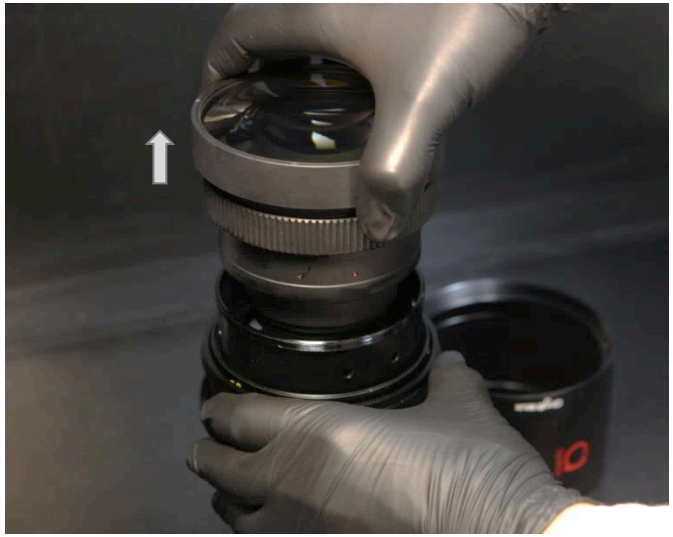

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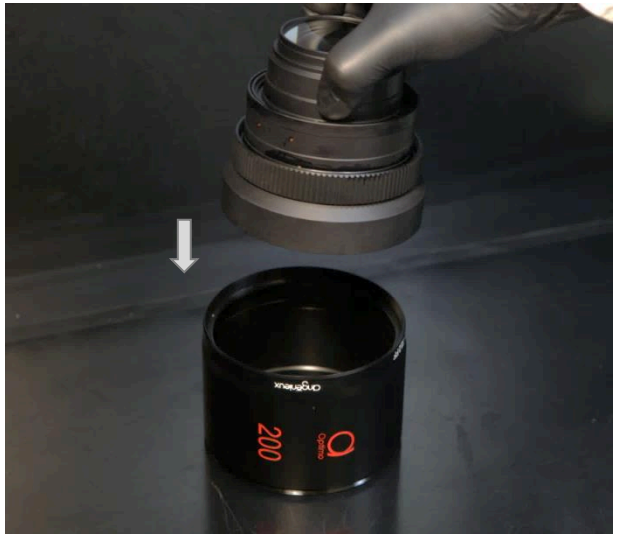

3

## STEP 3: REMOVE THE FOCUS GROUP

1 - Put in position the internal part of the IOP element spanner 66067121AA and rotate it counterclockwise so it falls in the correct thread position

2 - Tighten the internal part of the spanner up to the end-stop. Do not apply more torque after you reached the end-stop.

3 - Put in position the external part of the focus group spanner and rotate it left or right so the two pins fit perfectly with the retainer holes.

4 - Untighten the focus group retainer with the external part of the focus group spanner.

5 - Pull straightly the focus group by the internal part of the focus group spanner. As there is an o-ring around the focus group mechanics you need to pull with enough force. The focus group and the retainer will come out with the spanner.

6 - Untighten the focus group from the spanner and put the focus group in a secure area onto the focus group holder 66067075AA. You can put a tissue on the optical element to protect it from dust pollution.

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### STEP 4: REMOVE THE IRIS SUB-ASSEMBLY

Please refer to the section “5 - IOP ELEMENT SWAP” and “STEP 6: REMOVE THE IRIS SUB-ASSEMBLY”

### STEP 5: REMOVE INTERNAL GLASS ELEMENT OR IOP FILTER

Please refer to the section “5 - IOP ELEMENT SWAP” and “STEP 5: REMOVE INTERNAL GLASS ELEMENT OR IOP FILTER”

### STEP 6: REASSEMBLE INTERNAL GLASS ELEMENT OR IOP FILTER

Please refer to the section “6 - REASSEMBLING” and “STEP 2: INTERNAL GLASS ELEMENT OR IOP FILTER”

### STEP 7: REASSEMBLE THE IRIS SUB-ASSEMBLY

Please refer to the section “6 - REASSEMBLING” and “STEP 1: IRIS SUB-ASSEMBLY”

## STEP 8: REASSEMBLE THE FOCUS GROUP

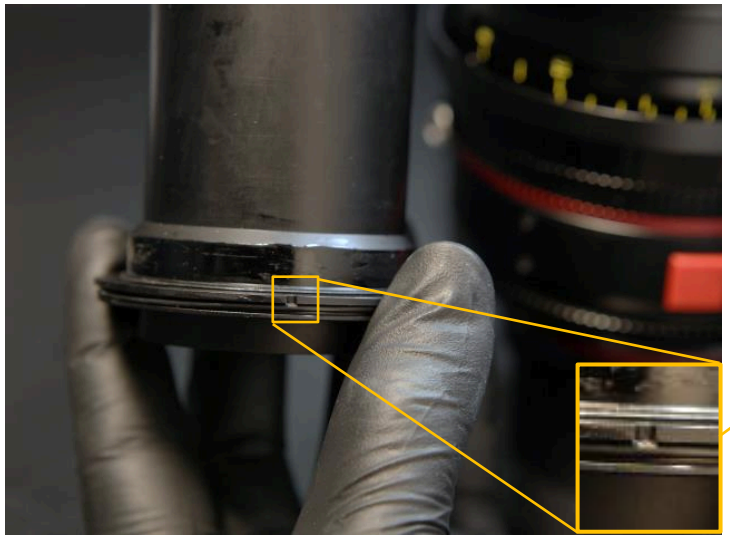
0 - Before putting back the focus group check the optical element cleanliness. If necessary, blow dry air and clean it properly.

1 - Mount the focus group onto the internal part of the IOP element spanner 66067121AA. Rotate counterclockwise the focus group so it falls in the correct thread position. Tighten to the end-stop. Do not apply more torque after you reached the end-stop.

2 - Align the locating hole of the focus group with the internal focus group locating pin.

3 - Put the focus group back in the lens straightly only with the internal part of the IOP element spanner.

4 - Push straightly on the spanner to secure the focus group with the o-ring.



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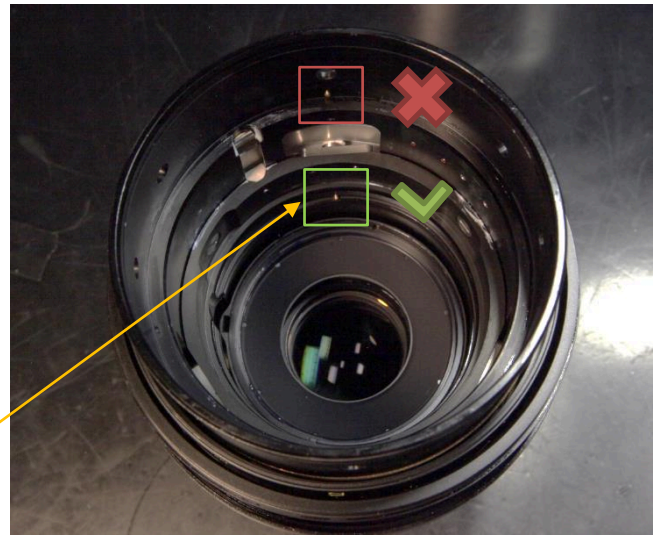

4

5 - With the hands, put gently the retainer on the focus group. The pin holes of the retainer must be on top.

6 - Put the external part of the IOP element spanner 66067121AA. Rotate counterclockwise the external part of the spanner so the spanner pins are into the retainer pin holes. Continue to rotate counterclockwise the external part of the spanner so the retainer falls in the correct thread position.

7 - Tighten the retainer with the external part of the spanner. Do not apply high torque and tighten the retainer just in contact.

8 - Untighten the internal part of the spanner and pull out the whole spanner by the internal part of the spanner.

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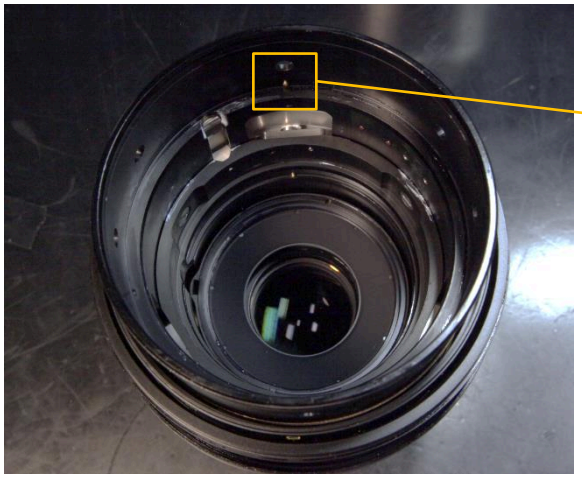
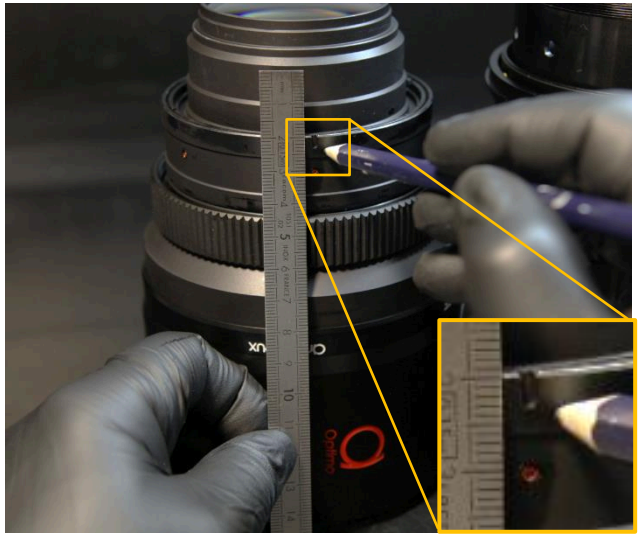
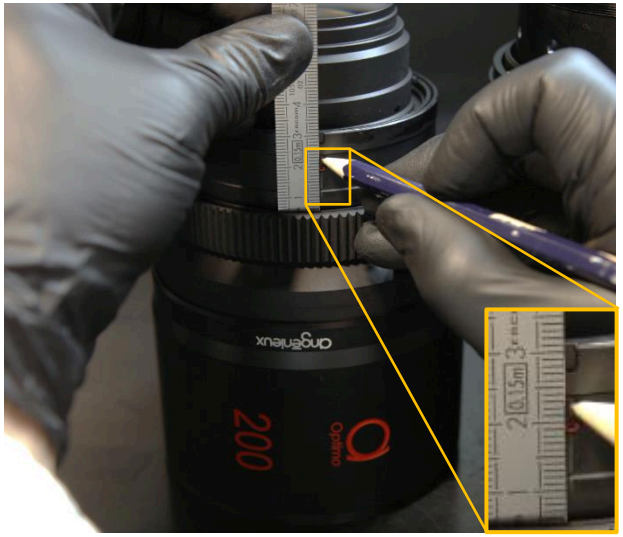
## STEP 9: REASSEMBLE THE FRONT GROUP

**CAUTION:** when putting in place the front group, the internal locating pin isn't visible from the inside. It is only visible from the outside.



1 - With a pencil, draw a line lined up with the locating hole of the front group.





Before putting back the front group check the optical element cleanliness. If necessary, blow dry air and clean it properly.

2 - Align the locating hole of the front group with the internal front group locating pin looking from the outside.

3 - Put the front group back in the lens straightly with the hand. Check that the drawn line stays lined up with the front group locating pin.

4 - By holding the front group with one hand, tighten the front group retainer. Do not apply high torque and tighten the front group retainer in contact. While tightening, check that the front group is going down straightly by checking the drawn line position in regards to the hole and front group locating pin.

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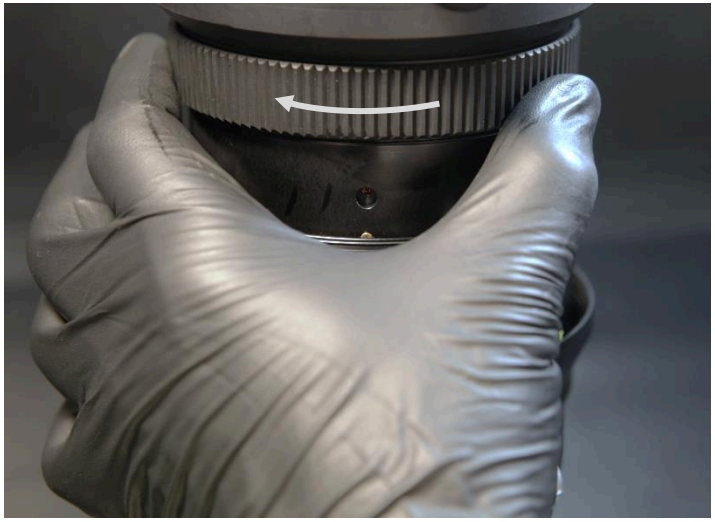


4

## STEP 10: REASSEMBLE THE FRONT ENGRAVED RING

0 - Before putting back the front engraved ring, check the inner cleanliness. If necessary, blow dry air and clean it properly.

1 - Position the front engraved ring with the white “F200 – T2.2 FF” engraving on the LEMO connector side.

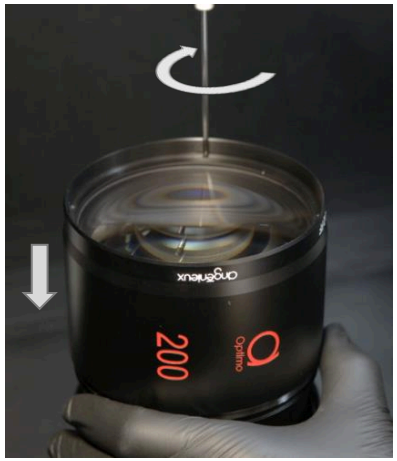
2 - Slide straightly the front engraved ring and center the front engraved ring holding screw holes with the screw holes of the lens core.

3 - Tighten all the front engraved ring screws. Do not apply high torque and tighten the screws just in contact.

4 - Pull up the fixed focus witness mark ring and rotate it until the locating pin reach the positioning hole of the front engraved ring.

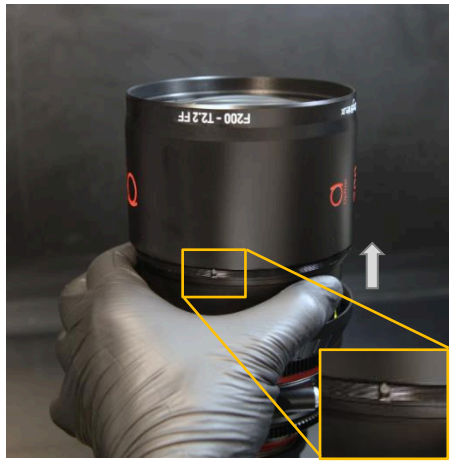
5 - Pull up the fixed focus witness mark ring and pull up the front engraved ring retainer and tighten it. Do not apply high torque.


1




2-3


4




4


5

# 7 - FINAL CHECK

Even if at each step we already recommend to check and validate that all is reassembled correctly, it is important to perform a complete final check. If you detect an issue, go back to the needed step and do it again. If you are still facing issues, please contact your local reseller or our service team at angenieuxservice@fr.thalesgroup.com.

1 - Update the outer IOP pins to set visually the configuration of the IOP elements you put in.

2 - Check that you reassembled the same amount of parts that you have disassembled.

3 - Check that all outer rings have no play.

4 - Check the focus and iris torque. Torque should be the same as before the IOP swap. It should be smooth and even.

5 - For F24, F28, F32, F40, F50, F60, F75, F100, check that the iris ring is not moving when you rotate the focus gear back and forth.

6 - Check the image quality in projection or on camera. Image quality should be the same as before the IOP swap. If you notice any image unevenness, one of the optical group may not be in the correct position.

7 - Check the engraved focus distances, iris opening and metadata matching.