



OPTIMO PRIME

User manual

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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.

Foreword

Congratulations on the purchase of Angénieux Optimo Prime lenses. 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 Jepsen 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 series. 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) technology

SLIVER SET

F21, F28, F40
F50, F75, F135



GOLD SET

Silver Set
+
F18, F32, F100



PLATINIUM SET

Gold Set
+
F24, F60, F200



IOP

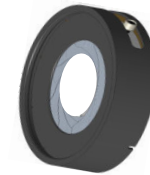
IOP internal filter (afocal area)

Diffusion, vintage look, flares...



IOP Iris sub assembly

Various blade options



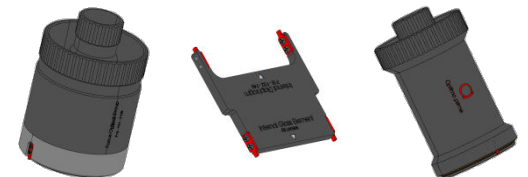
IOP Rear filter

Diffusion, vintage look, ...



IOP tooling set

To access to all internal IOP elements



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0 - Safety information

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.

WARNINGS

- Handle any lens with care.
- Do not expose lens to water or moisture.
- Do not subject the lens to severe 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 any paint marked screws.
- 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 $+70^{\circ}\text{C}$ (-40°F and $+158^{\circ}\text{F}$).
- 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 $+45^{\circ}\text{C}$ (-4°F and $+113^{\circ}\text{F}$).
- 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 is 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.

1 - What's in the box?

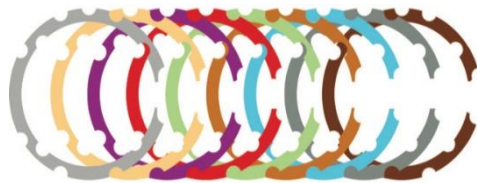


Box

Optimo Prime equipped with front and rear caps



Product information and QR code link to access to the user manual



Set of 9x color shims for back focus adjustment (see section 7)



Extra barrel and filter for use on S35 camera
Only included with F50, F60, F75, F100, F135, F200 (see section 5)



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

2 - Technical information

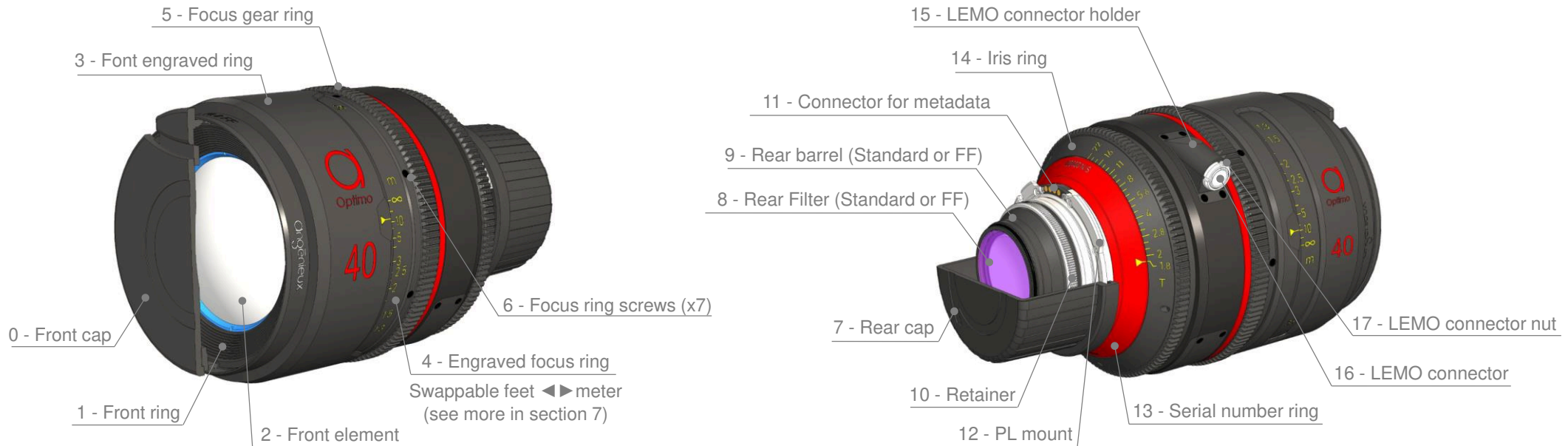
Focal length	18 mm	21 mm	24 mm	28 mm	32 mm	40 mm	50 mm	60 mm	75 mm	100 mm	135 mm	200 mm
T-Stop at full aperture	2	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	2.2
Minimum Object Distance (MOD) ¹	1'2"	1'2"	1'2"	1'2"	1'2"	1'2"	1'4"	1'8"	2'	2'6"	3'3"	4'
Horizontal angular FOV ²	97.0°	87.8°	81.3°	72.5°	65.3°	54.3°	44.3°	37.3°	30.1°	22.9°	17.0°	11.5°
Vertical angular FOV ²	65.0°	57.0°	51.4°	44.7°	39.5°	32.0°	25.7°	21.5°	17.3°	13.0°	9.6°	6.5°
Front diameter (mm)	95	95	95	95	95	95	95	95	95	95	95	114
Length (mm) From front to PL mount	159	140	128	128	128	128	128	128	128	128	140	190
Weight (kg) (Lbs)	1.9 4.18	1.8 3.96	1.7 3.75	1.7 3.75	1.7 3.75	1.7 3.75	1.7 3.75	1.7 3.75	1.7 3.75	1.8 3.96	2.0 4.40	2.3 5.07

Common features	<p>PL mount</p> <p>Image coverage 46.3 mm (covers RED Monstro, Sony Venice, Alexa LF cameras)</p> <p><u>Focus:</u> Internal focus, Feet and Metric scales available on the same ring, two opposing non-linear focus scales, 320° focus ring angular rotation (end stop to end stop), focus drive gear 132 teeth 0.8 metric module, possibility to go “beyond” infinity and close focus</p> <p><u>Iris:</u> 9 blades diaphragm, two opposing linear T-Stop scales, 75° iris ring angular rotation, iris drive gear 132 teeth 0.8 metric module</p> <p><u>Metadata interface:</u> available through external Lemo connector and connector on PL mount. Cooke/i compatible and ARRI LDS2 ready</p> <p><u>Accessories:</u> LPL mount, IOP internal filters, IOP iris, IOP rear filter, IOP tool kit</p>
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1 : from image plane

2 : H40.50mm x V22.40mm sensor

3 - General view and installation



For a standard installation on camera please proceed as below:

- Remove the rear cap (7) and make sure the rear filter (8) is clean. If not, please refer to maintenance section 8
- Make sure the Optimo Prime PL mount (12) and camera mount are perfectly clean
- Mount the Optimo Prime on the camera mount with electronic pins in the correct orientation. Lock the camera mount
- Remove the front cap (0) and make sure the front element (2) is clean. If not, please refer to maintenance section 8
- While using motors, to prevent damaging the lens mechanisms make sure the motors are calibrated properly before operating them

CAUTION: there are three front cap types. Type1 (8mm thickness) for F18-F21-F24-F28-F135, type2 (6mm thickness) for F32-F40-F50-F60-F75-F100 and type3 for F200.

CAUTION: for the short focal length up to F28 included, the front engraved ring has an opening. To prevent the cap falling from the lens, make sure the cap is with its correct orientation so it clamps perfectly on the ring (spring button on the top of the lens towards the largest edge)

With the Integrated Optical Palette (IOP) capability, our Optimo Prime series offer you a visual external IOP configuration identification. This identification allows you to quickly and easily know the configuration of the IOP elements in place in your Optimo Prime. It consists in three interchangeable pins with different colors and labels. As a standard, we deliver the lens with two red pins and one red pin with the label '9' which corresponds to the nine blades iris and standard internal and rear filters. Colors and label configuration is described in the table below.

TYPE	DESCRIPTION	REFERENCE
FILTER (standard)	RED IOP PINS WITHOUT ENGRAVING	66066521AC
INTERNAL FILTER clear optics	WHITE IOP PINS WITHOUT ENGRAVING	66067528AA
INTERNAL FILTER uncoated	RED IOP PINS WITH 'UCM' ENGRAVED	66067529AF
INTERNAL FILTER blue streak	RED IOP PINS WITH 'BSM' ENGRAVED	66067529AG
IRIS 9 Blades (standard)	RED IOP PINS WITH '9' ENGRAVED	66067529AE
IRIS 3 Blades	RED IOP PINS WITH '3' ENGRAVED	66067529AC
IRIS oval shape	RED IOP PINS WITH '0' ENGRAVED	66067529AB



4 - Spare parts and optional accessories

In case you need additional spare parts, please contact your local reseller or our service team at: angenieuxservice@fr.thalesgroup.com.

SPARE PARTS COMPATIBLE WITH ALL OPTIMO PRIMES	
(0) - Front cap	400004368 (F18-F21-F24-F28-F135) – 8 mm thickness 400004365 (F32-F40-F50-F60-F75-F100) – 6 mm thickness 0311819 (F200)
(7) – PL mount cap	0311816
(5) - Focus gear ring	400001178
(15) - LEMO connector holder / (16) - LEMO connector / (17) LEMO connector nut	400006554 / 400006553 / 400006551
(13) - Serial number ring	400001891 (serial number to be provided)
(11) – Connector for metadata	400006939
(8) - Rear filter	66068699AA (Standard)/ 66068700AA (FF)
(12) - PL mount	400004529
Flange shim set of 9 shims (see size detail in section 7)	66067355AA
Screws for front ring - only for F18, F21, F24, F28 (x8)	982137
Screws for front engraved ring	33-000072
(6) - Screws for focus ring (x7)	981997
Screws for PL mount (x8)	400001786
Screws for LEMO connector holder (x4 with threadlock)	982007
Screws for camera interface metadata connector	33-000061
Special rear filter for projection control (see section 7 - LENS CONTROL IN PROJECTION)	66066496AA (additional rear barrel may be purchased 400005545)

ADDITIONAL ACCESSORIES COMPATIBLE WITH ALL OPTIMO PRIMES	
Lemo to USB cable for computer electronic settings	66068093AA
Electronic setting software to be downloaded	https://www.angenieux.com/service-and-support/
LPL mount	Ask your local reseller or Angénieux service team
IOP tooling set	66067558AA
IOP internal filter / iris / rear filter	Ask your local reseller or Angénieux service team

SPECIFIC SPARE PARTS	F18	F21	F24	F28	F32	F40	F50	F60	F75	F100	F135	F200
(1) - Font ring	400005236	400005165	400006623	400005012	400004602	400002944	400003584	400003584	400003584	400004816	400002685	-
(3) - Front engraved ring	400004912	400003741	400006622	400003498	400004579	400001887	400003490	400005039	400004624	400002521	400002487	400006287
(4) – Engraved focus ring	66067995AA	66067995AA	66067995AA	66067995AA	66067995AA	66067995AA	66067997AA	66068551AA	66067998AA	66068552AA	66067996AA	66068553AA
(14) - Iris ring	400006041	400005066	400005066	400005066	400005066	400005066	400005066	400005066	400005066	400005066	400005066	400007110
(9) - Rear barrel standard	400005550	400005550	400005550	400005550	400005550	400005550	400005545	400005545	400005545	400005545	400005545	400005545
(9) - Rear barrel for S35	-	-	-	-	-	-	400005547	400005547	400005547	400005547	400005547	400005547

5 - Mechanical compatibility

The Angénieux Prime series design spirit was to keep as much as possible the same mechanical dimensions for a maximum of lenses. Due to mechanical and optical design constraints, we had no other choice than having two different types of rear mechanics to be compatible with the maximum cameras on the market.

IMPORTANT: Angénieux will decline any responsibility for any camera mount damage due to improper configuration of the lens rear filter.



Focal lengths F18, F21, F24, F28, F32, F40 equipped with the standard rear filter are compatible with all digital cameras. Standard filter barrel is engraved “DIGITAL CAMERA COMPATIBLE”.

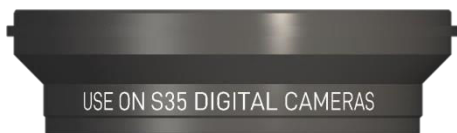
This barrel and a 40.5mm filter are mounted as a standard only on F18, F21, F24, F28, F32, F40. Filter thread is 40.5mm.

For focal lengths F50, F60, F75, F100, F135, F200 **always be cautious to use the proper rear filter mechanical interface.**



For **FF cameras**, larger filter use prevents noticeable vignetting in the edges on a 46.3mm sensor diagonal. It's mandatory to use the filter barrel engraved “DO NOT USE ON S35 CAMERAS”.

This barrel and a 46mm filter are mounted as a standard only on F50, F60, F75, F100, F135, F200. Filter thread is 46mm.



For **S35 cameras, collimators and projection system**, do always use the filter barrel engraved “USE ON S35 DIGITAL CAMERAS”. This extra barrel and 40.5mm filter are only included with F50, F60, F75, F100, F135, F200. Filter thread is 40.5mm.

Focal length	F18	F21	F24	F28	F32	F40	F50	F60	F75	F100	F135	F200
Rear filter thread for S35 (mm)	40.5	40.5	40.5	40.5	40.5	40.5	40.5	40.5	40.5	40.5	40.5	40.5
Rear filter thread for FF (mm)							46.0	46.0	46.0	46.0	46.0	46.0

If you have any doubt on the use of your lens on a camera please contact your local reseller or our service team at: angenieuxservice@fr.thalesgroup.com

6 - Electronics specifications

The Optimo Primes are compatible with the Cooke /i Technology version 3.0 (June 2012) and are ARRI LDS2 ready.

Updates of the embedded software can be found at <https://www.angenieux.com/service-and-support/#downloads> or by contacting your distributor. Use the cable #66068093AA to connect the lens to the USB port of the computer for software update and focus or iris data adjustments during lens maintenance.

		Voltage	Consumption
Camera connector	4 pins on PL mount	9-42 V	About 50 mA / 12V
External connector	LEMO 4 pins connector EGB00304CLL	9-42 V	About 50 mA / 12V

If you are facing communication problems between the camera and the lens:

- If the lens is connected with the Lemo connector, unplug it, wait few seconds and reconnect it
- If it is still not working, switch off the camera or the external viewer
 - Disconnect the lens
 - Reconnect the lens with the camera or the external device
 - Switch the camera or the external device back on
- If the problem continues, contact your local reseller or Angénieux international customer support at: angenieuxservice@fr.thalesgroup.com

7 - Ajustements

TOOLS FOR ADJUSTMENT

In the below table you can find the three screwdrivers and the LEMO spanner we are using in factory. You can use your proper tools but be sure they can fit perfectly to prevent any damage on the screws head, rings or optics.

Description	Type	Reference
Screwdriver for PL mount screws	Torx screwdriver	FACOM T6 ATX6x50
Screwdriver for Phillips screws	Phillips screwdriver	WERA 345290 PH000
Spanner for LEMO connector nut 4pins	Special spanner	LEMO DCH.91.101.PA
Spanner for LEMO connector nut 6 pins	Special spanner	-
Set of flat spanners for collet nuts	Special spanner	-

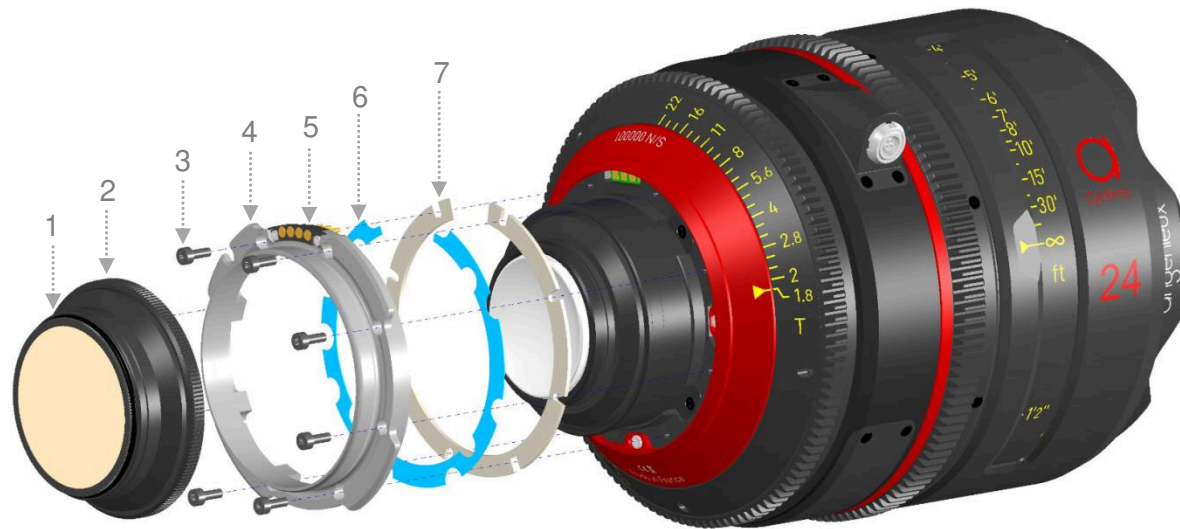
REPLACING THE MOUNT

Please refer to the next page figure for the parts numbers into brackets.

- Place the Optimo Prime on the front cap
- Remove the rear filter assembly (1) by untightening the retainer (2) anticlockwise
- Untighten and remove the eight torx screws (3) from the PL mount and remove the PL mount (4)
- CAUTION:** pull out the PL mount straightly to prevent from any damage of the electronic camera interface inner pins (5)
- Remove the two holding screws and the electronic camera interface (5)
- Replace the defective PL mount with a new one
- Put back all elements in reverse order
- Check your back focus and change the thickness of the flange shims to adjust the back focus distance if necessary

ADJUSTING THE BACK-FOCUS

All of our Optimo Prime lenses are set with the 52mm industry PL standard flange distance and delivered with a color shim set. If you need to adjust the back focus flange to fit more accurately to the position of the sensor on the camera, you need to modify the rear color shim thickness. Please proceed as follow. You can apply this procedure for all of the Optimo Prime lenses and any possible combination of shims can be used to achieve the required thickness and therefore the required flange focal distance.



 Silver 0.0005" - 0.01mm	 Amber 0.001" - 0.025mm	 Purple 0.0015" - 0.04mm
 Red 0.002" - 0.05mm	 Green 0.003" - 0.08mm	 Tan 0.004" - 0.1mm
 Blue 0.005" - 0.125mm	 Matte 0.0075" - 0.19mm	 Brown 0.010" - 0.25mm

- Remove the rear filter assembly (1) by untightening the retainer (2) anticlockwise
- Remove the eight torx screws (3) from the PL mount and remove the PL mount (4)

CAUTION: pull out the PL mount straightly to prevent from any damage of the connector (5)

- Remove the installed shims (6) by using a flat-bladed screw-driver or a pair of tweezers. Determine the total thickness of the shims already installed. Increase or decrease the total shim thickness according your needs

CAUTION: do always put back the aluminum factory shim (7) under the color shims

- Put back all elements in reverse order

FEET TO METER AND METER TO FEET SWAP

All of the Optimo Prime lenses have their focus scale ring engraved with both feet and metric scales. The swap of the focus scale from one system to the other must be done with cautious in a clean environment to prevent dust or particles pollution inside the lens. If your focus ring needs to be replaced please contact your local reseller or our service team at angenieuxservice@fr.thalesgroup.com providing the serial number of the lens.

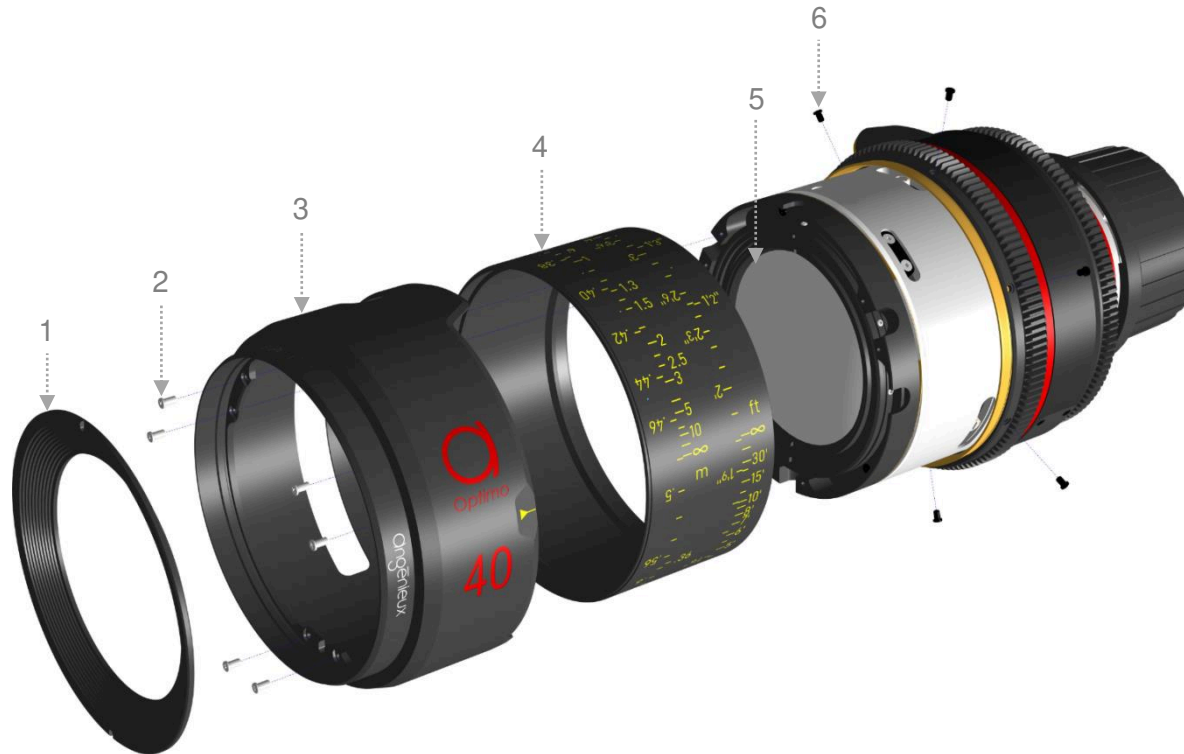
CAUTION: Please use a proper tool to prevent from any damage on the front ring (1) or on the front element (5). Parts numbers into brackets are referring to the next pages figures except for F200 one.

CAUTION: After swapping the scale, please do always check the focus ring functioning. If you notice a mechanical play on the focus ring, tighten more the seven Phillips screws (6) uniformly. If the focus torque is stiff or uneven, release and tighten more uniformly the seven Phillips screws (6). Parts numbers into brackets are referring to the next pages figures.

TIP: To help re-installing the focus scale, go to the infinity focus end-stop and put a pencil mark on the front engraved ring in front of the infinity position. When installing the focus ring, align the infinity engraving with the mark made. After installing the focus ring, check if the marks are correctly aligned by using a collimator, projector or camera. Proceed to a final accurate adjustment if necessary.

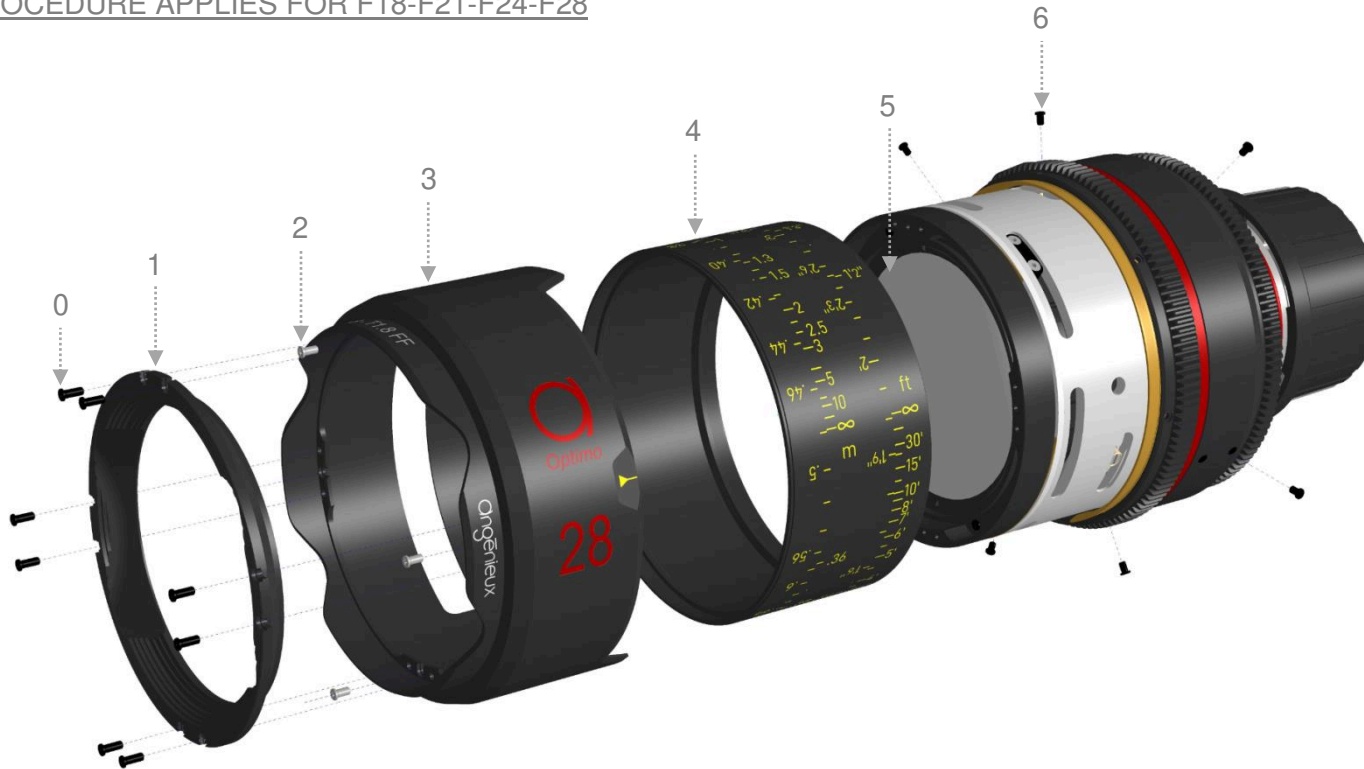


THE BELOW PROCEDURE APPLIES FOR F32-F40-F50-F60-F75-F100-F135



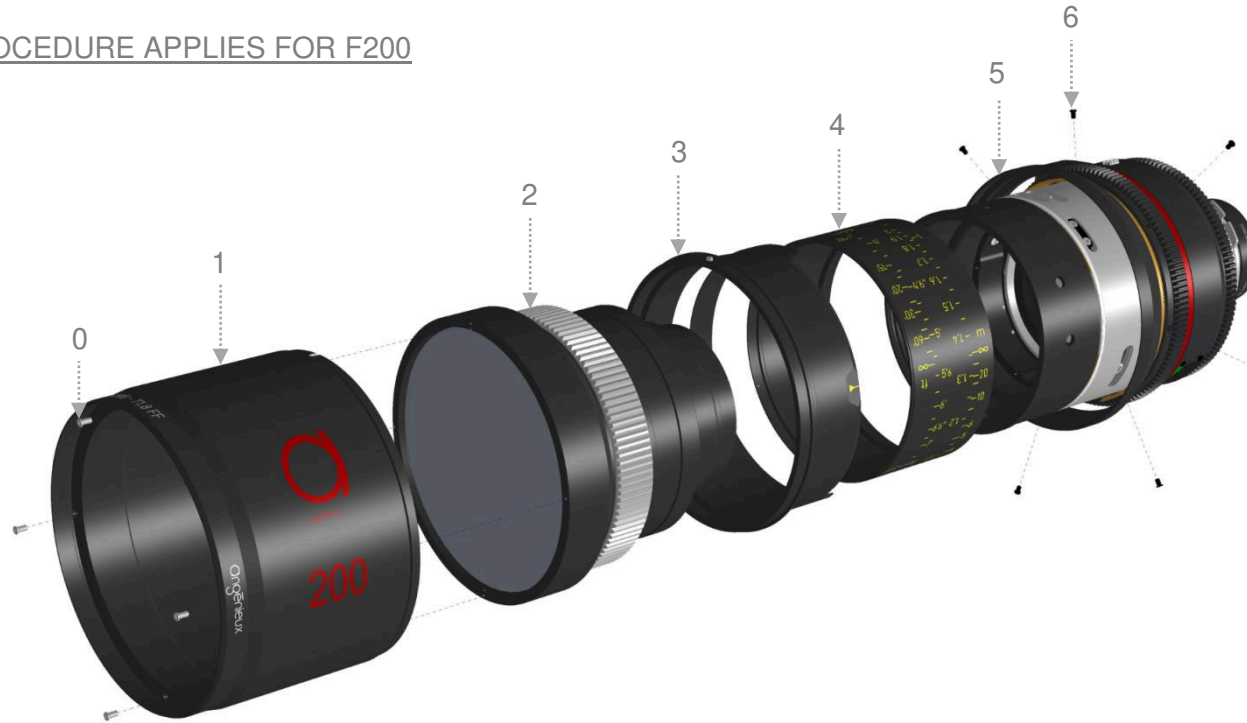
- Unscrew and remove the front ring (1)
- Untighten and remove the six Phillips screws (2). Pull out the front engraved ring (3)
- Untighten the seven Phillips screws (6) without removing them. Pull out the focus ring (4)
- Replace the focus ring or flip it by 180° for feet or meter use and tighten the Phillips screws (6) in contact
- Re-install the front engraved ring (3) and the front ring (1)
- Check and adjust the focus ring position to match the engraved distances and tighten uniformly the seven Phillips screws (6)
- Tighten all the screws in contact with a removable threadlock

THE BELOW PROCEDURE APPLIES FOR F18-F21-F24-F28



- Untighten and remove the eight Phillips screws (0) holding the front ring (1). Pull out the front ring (1). Note: only four screws (0) for F18.
- Untighten and remove the three Phillips screws (2). Pull out the front engraved ring (3)
- Untighten the seven Phillips screws (6) without removing them. Pull out the focus ring (4)
- Replace the focus ring or flip it by 180° for feet or meter use and tighten the Phillips screws (6) in contact
- Re-install the front engraved ring (3) and the front ring (1)
- Check and adjust the focus ring position to match the engraved distances and tighten uniformly the seven Phillips screws (6)
- Tighten all the screws in contact with a removable threadlock

THE BELOW PROCEDURE APPLIES FOR F200



- Untighten and pull towards the rear the front cover ring (5)
- Untighten and remove the four Phillips screws (0). Pull out the front engraved ring (1)
- Untighten the front group retainer (2) and pull out the front group. Put the front group securely in a dust free and protected area
- Pull out the fixed focus witness mark ring (3) and the front cover ring (5)
- Untighten the seven Phillips screws (6) without removing them. Pull out the focus ring (4)
- Replace the focus ring or flip it by 180° for feet or meter use and tighten the Phillips screws (6) in contact
- Put back all elements in reverse order
- Check and adjust the focus ring position to match the engraved distances and tighten uniformly the seven Phillips screws (6)
- Tighten all the screws in contact with a removable threadlock

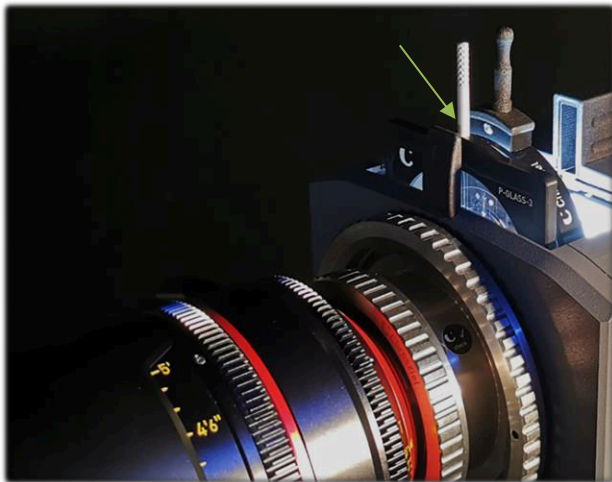
LENS CONTROL IN PROJECTION

Optimo Prime lenses are all adjusted and controlled in factory using a specific projection configuration to be the closest to the final use configuration. We are using within our lens projector a 3mm thickness additional neutral glass between the reticule and the Optimo Prime. This glass is designed for the simulation of optical low pass filters, ND filters and camera sensor protection glass of the ARRI Alexa series or cameras with similar light path.

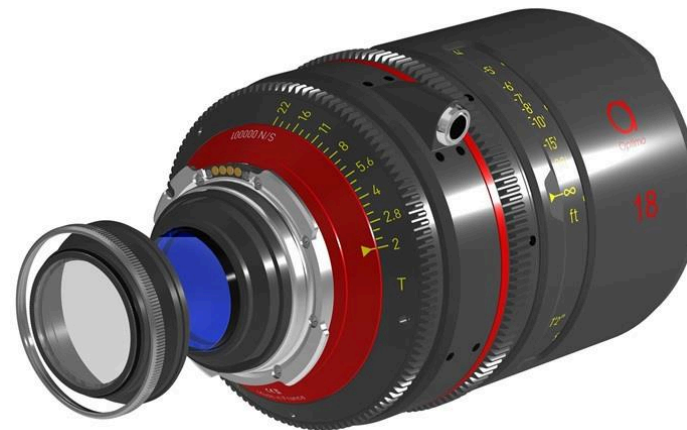
If you need to control your Optimo Prime in projection, we recommend you to use the same configuration to see the correct image. If you don't use any additional neutral glass you will have back focus issue and you may also see optical aberration such as field curvature.

If your lens projector doesn't allow you to position such a neutral glass, you can purchase a 5mm thickness rear filter for Optimo Primes (reference 66066496AA). To use this dedicated 5mm thickness rear filter you only need to untighten and remove the standard filter of your Optimo Prime and put in place the dedicated rear filter. The filter thread is 46mm and should be mounted on rear barrel reference 400005545.

CAUTION: Please only use the 5mm thickness rear filter for projection matters.



Lens projector configuration with 3mm thickness glass between reticule and Optimo Prime lens



Rear filter to swap from standard to 5mm thickness for projection use only

8 - Maintenance recommendations

CLEANING THE LENSES

For an optimum image quality, make sure that your Optimo Prime lens is cleaned every time you use it. To clean the optics, use an optical cleaning solution and use a soft cloth. For optimum cleaning use an optical cloth and an isopropyl alcohol liquid, start with the center and clean by turning outwards.

LUBRICATION

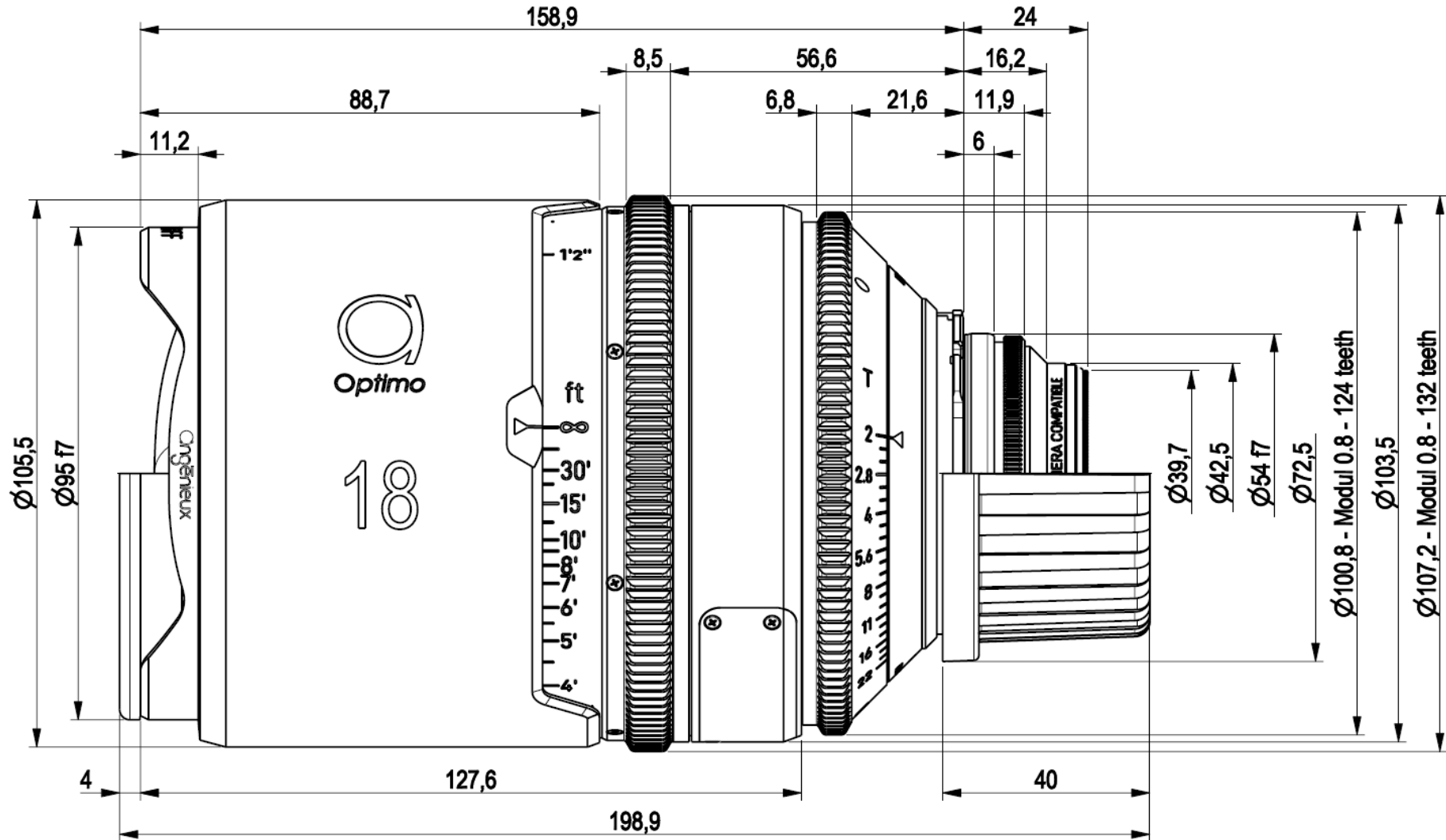
The focus and iris mechanisms are factory lubricated. If you stored an Optimo Prime lens for a long time or if you are going to use it in a cold environment, move the focus and iris rings several times before using it. If you used an Optimo Prime lens frequently or in extreme conditions, make sure the mechanisms work properly. If necessary, clean and lubricate the mechanism. It is highly recommended to use the grease provided by Angénieux. For any additional information please contact your local reseller or Angénieux international customer support at: angenieuxservice@fr.thalesgroup.com.

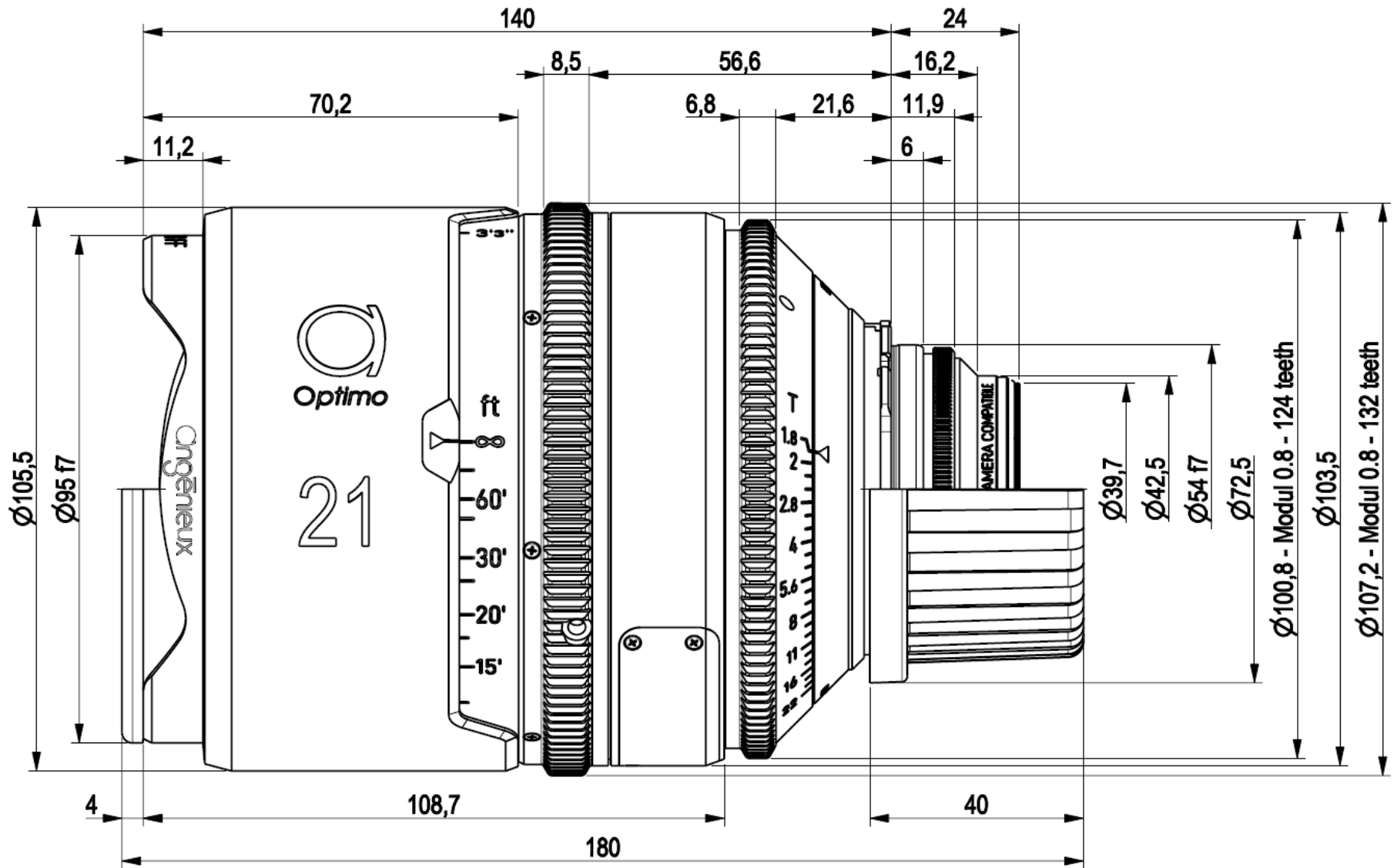
ADVANCED MAINTENANCE

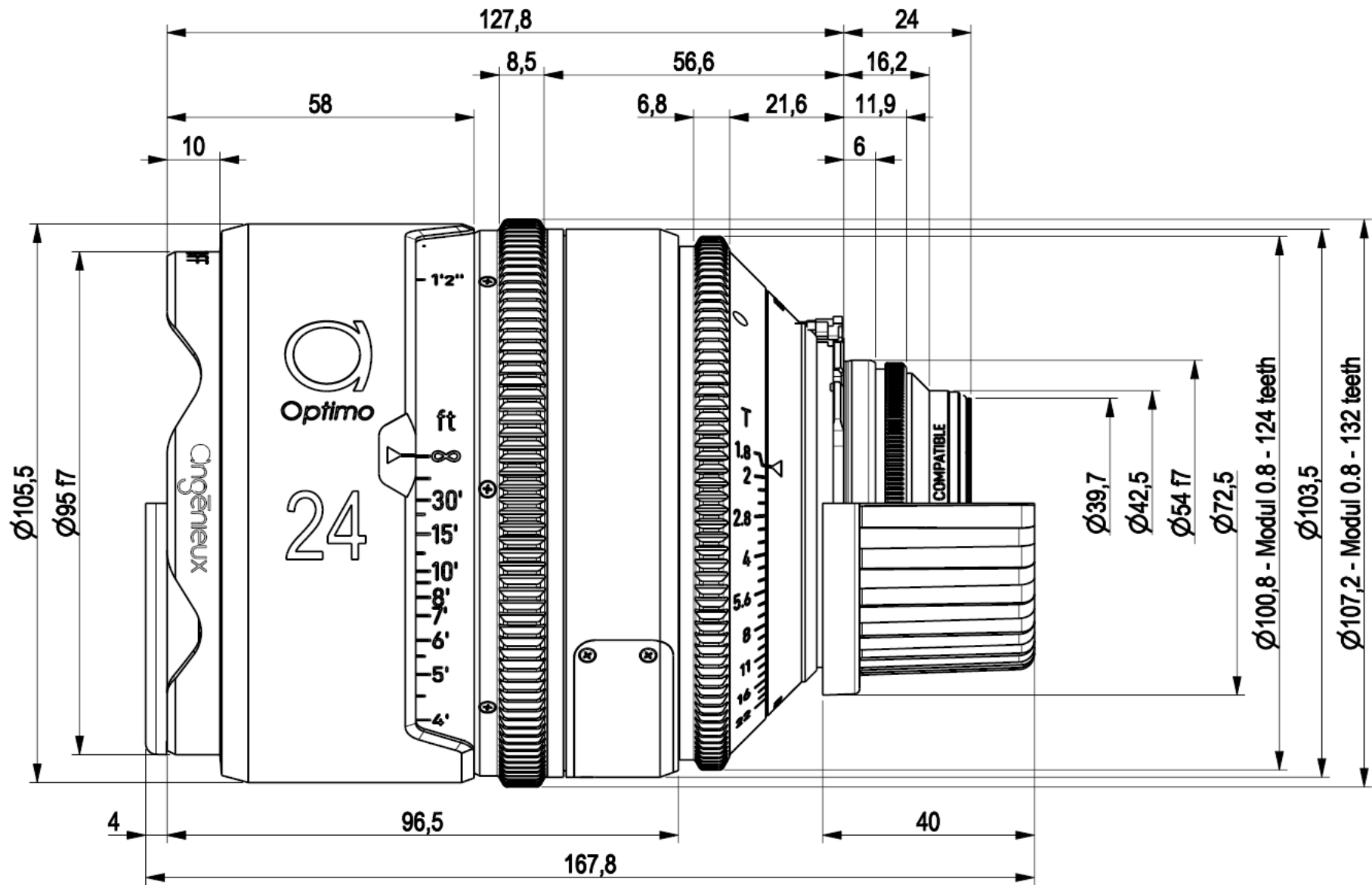
The deep maintenance of Optimo Prime lens should only be performed by a certified service center or factory trained technicians. For more information about where to send your Optimo Prime lens for service, please contact your local reseller or Angénieux international customer support at: angenieuxservice@fr.thalesgroup.com.

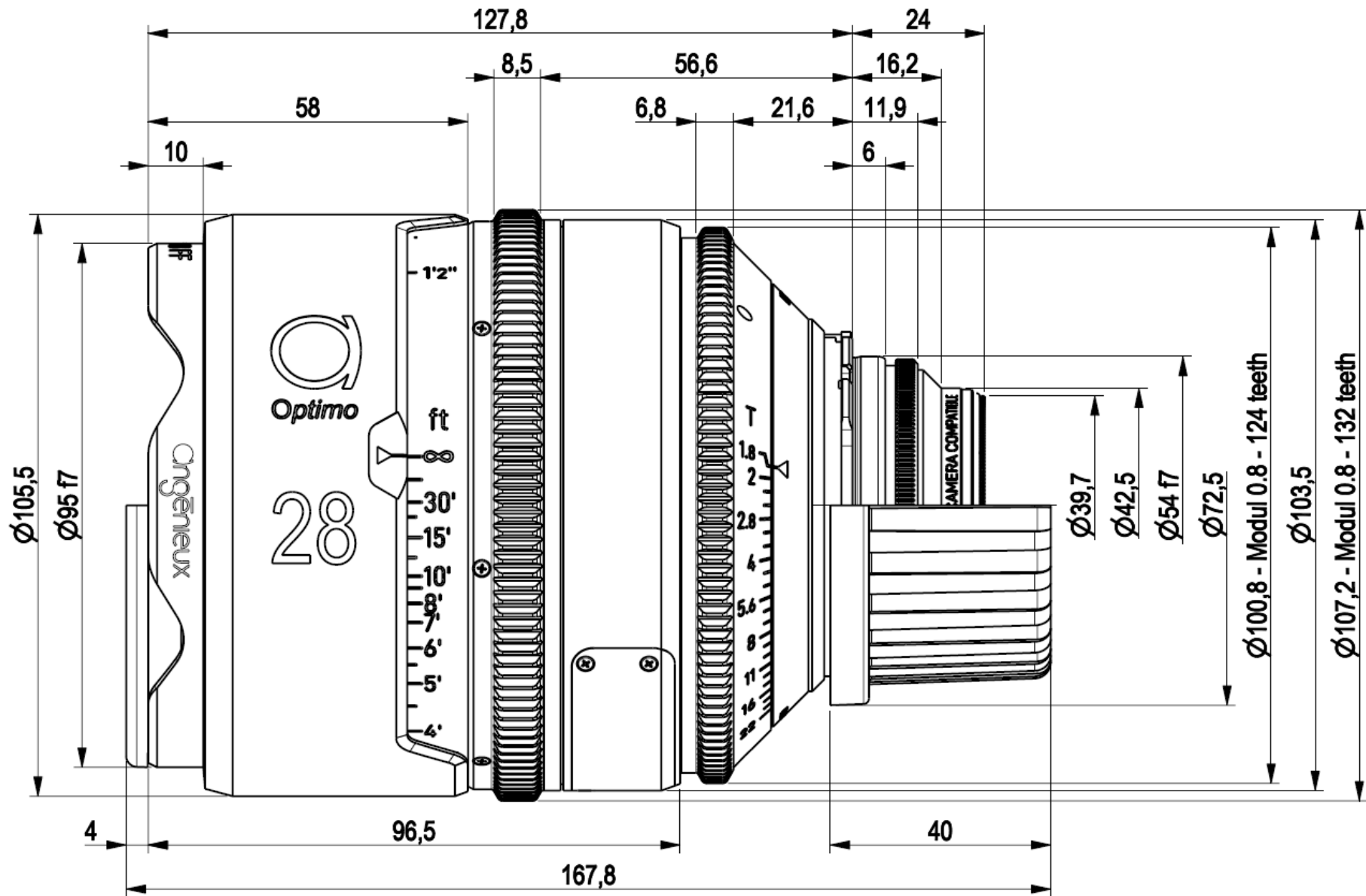
9 - Outline drawings

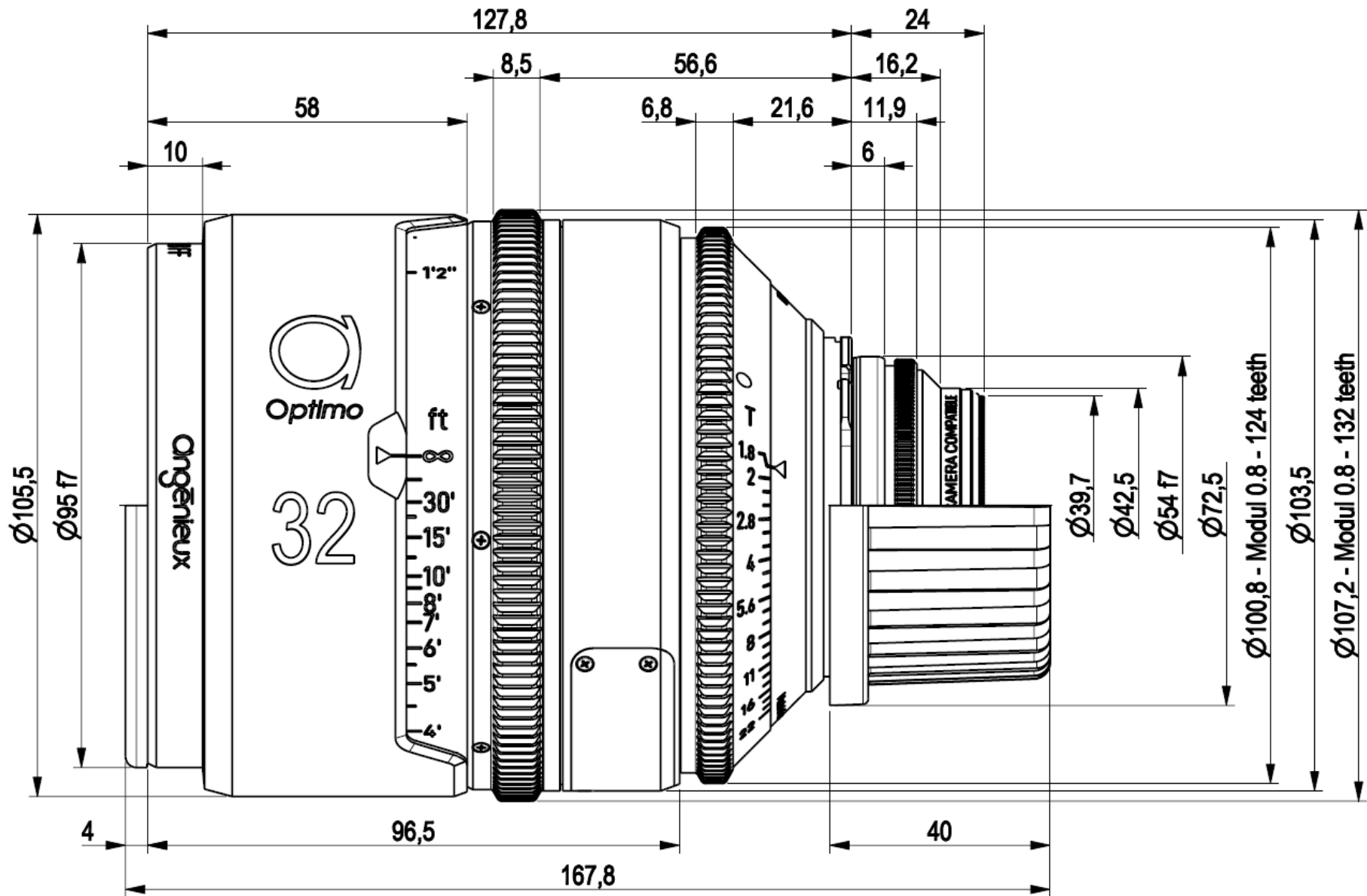
You will find in the next pages the outline drawings for all the focal lengths. Please be aware that the outline dimensions are unique for F18 and F200, are similar for F21 and F135 and are similar for F24, F28, F32, F40, F50, F60, F75, F100.

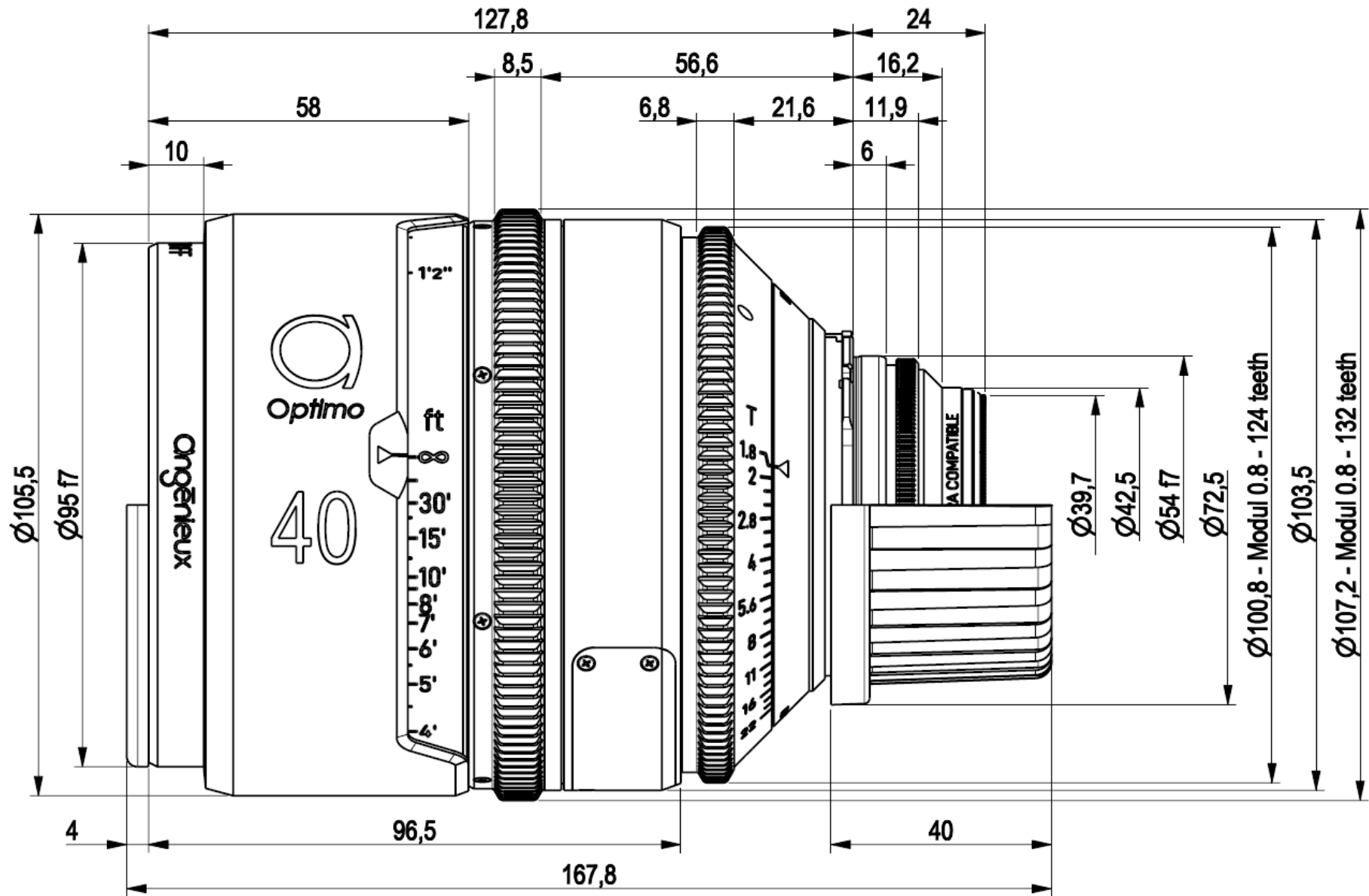


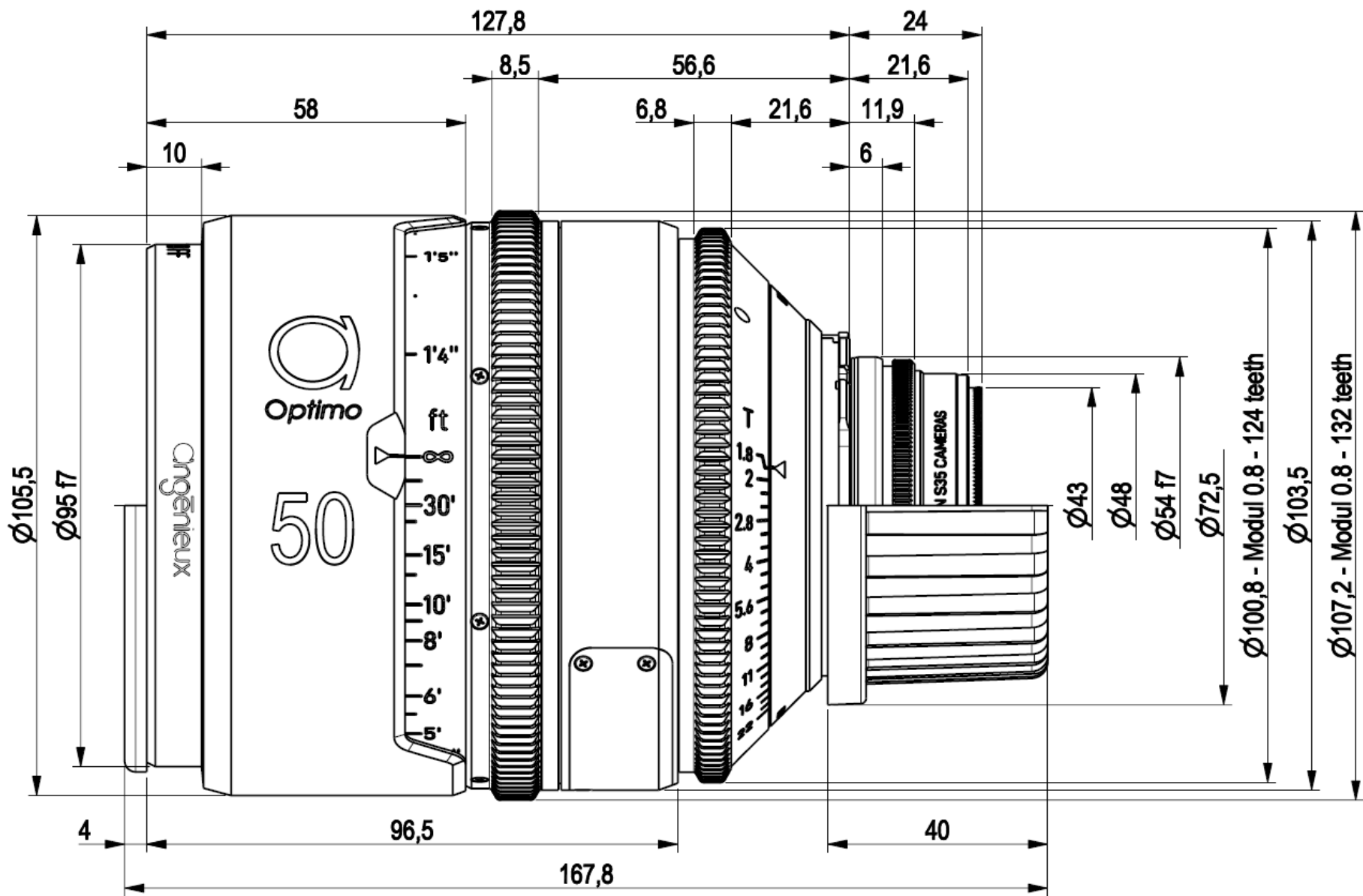


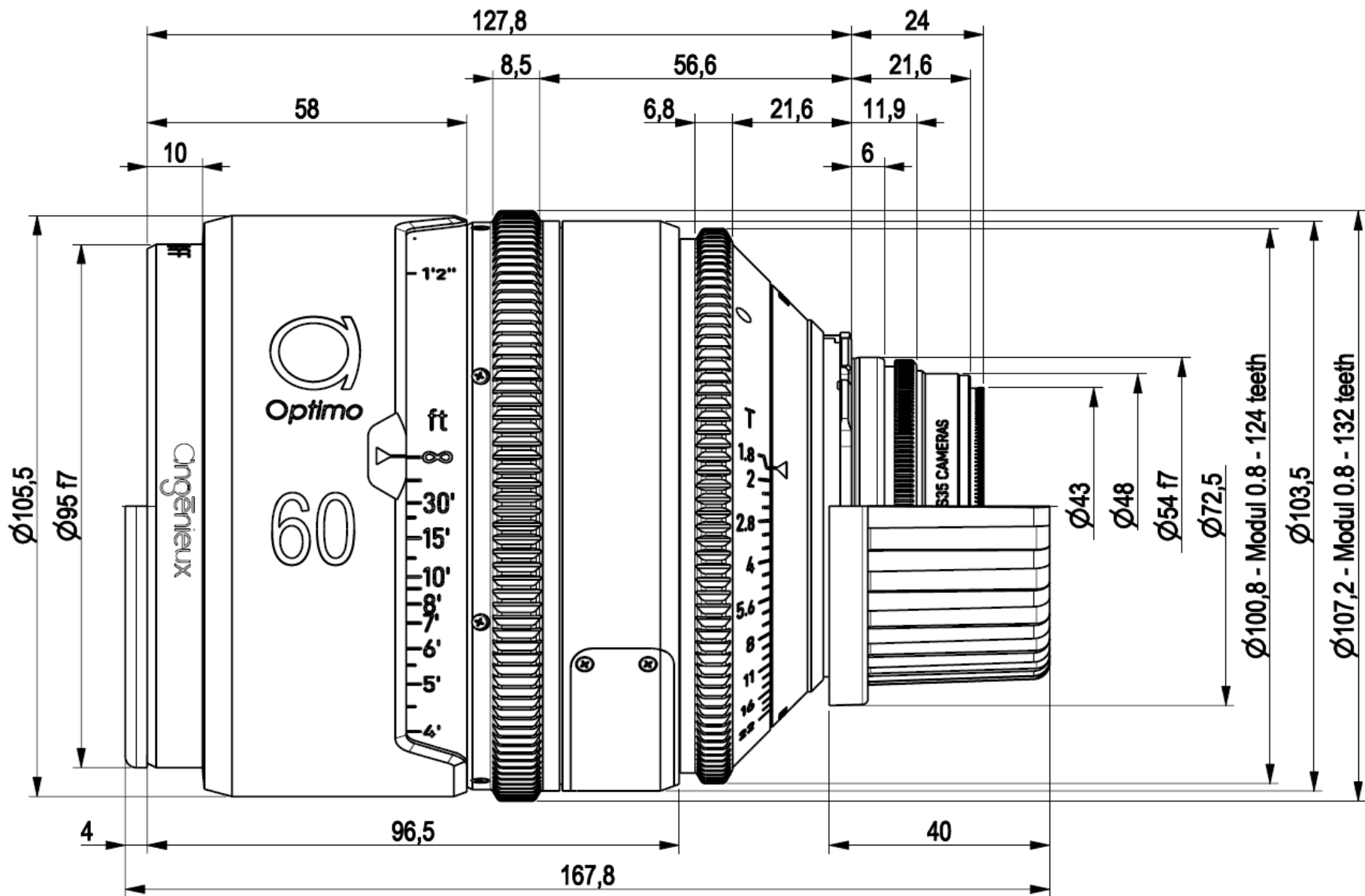


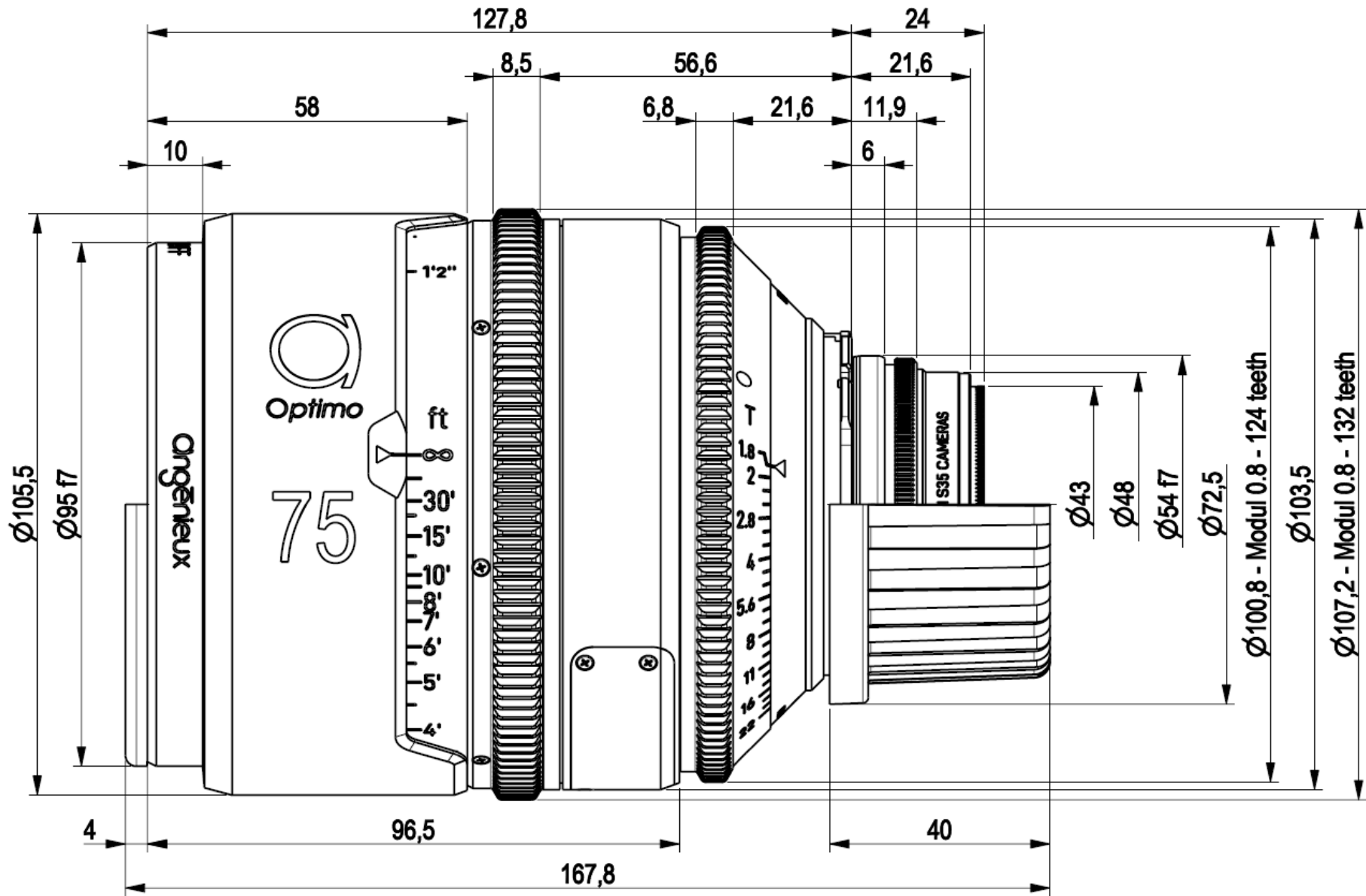


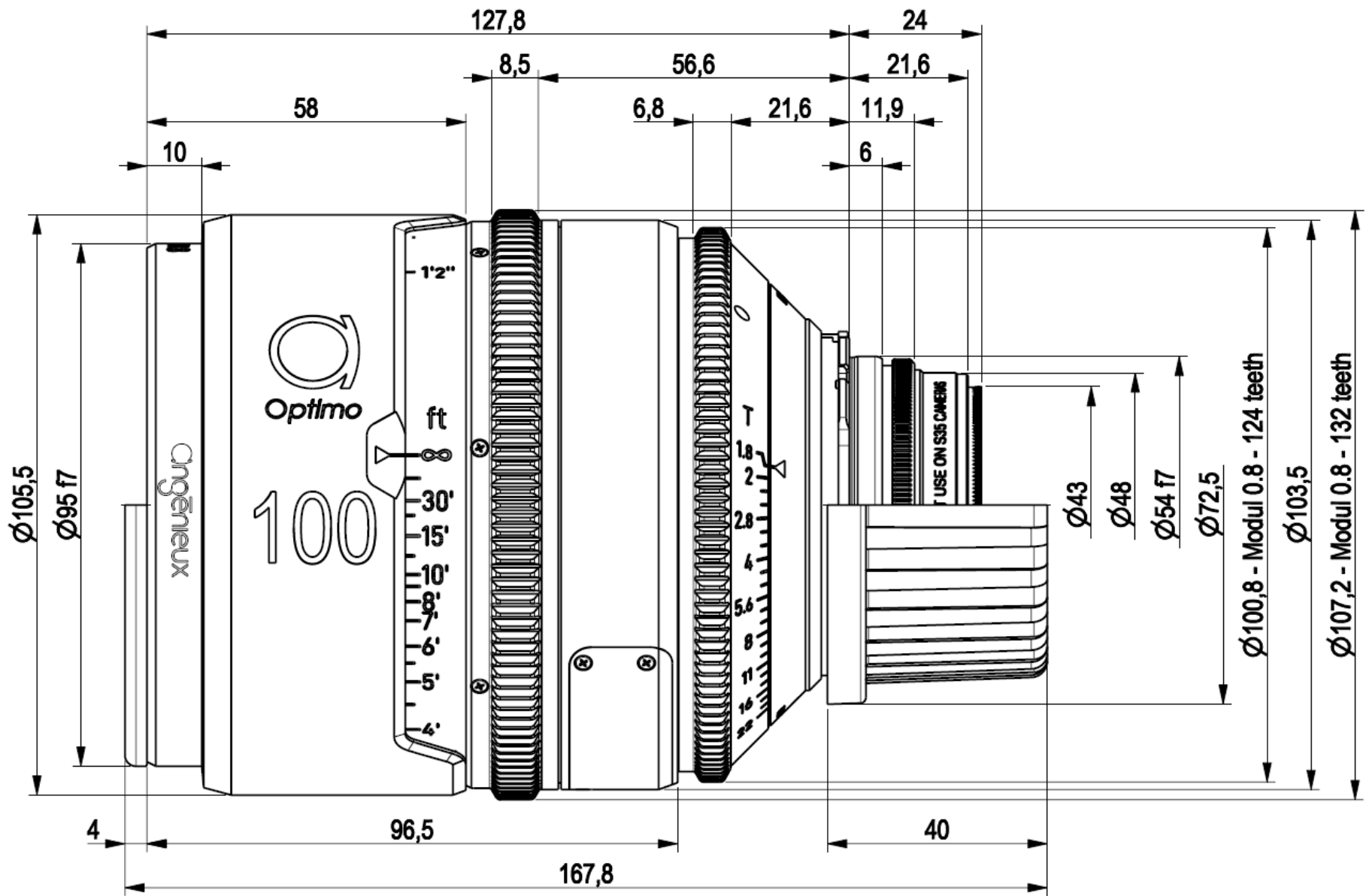


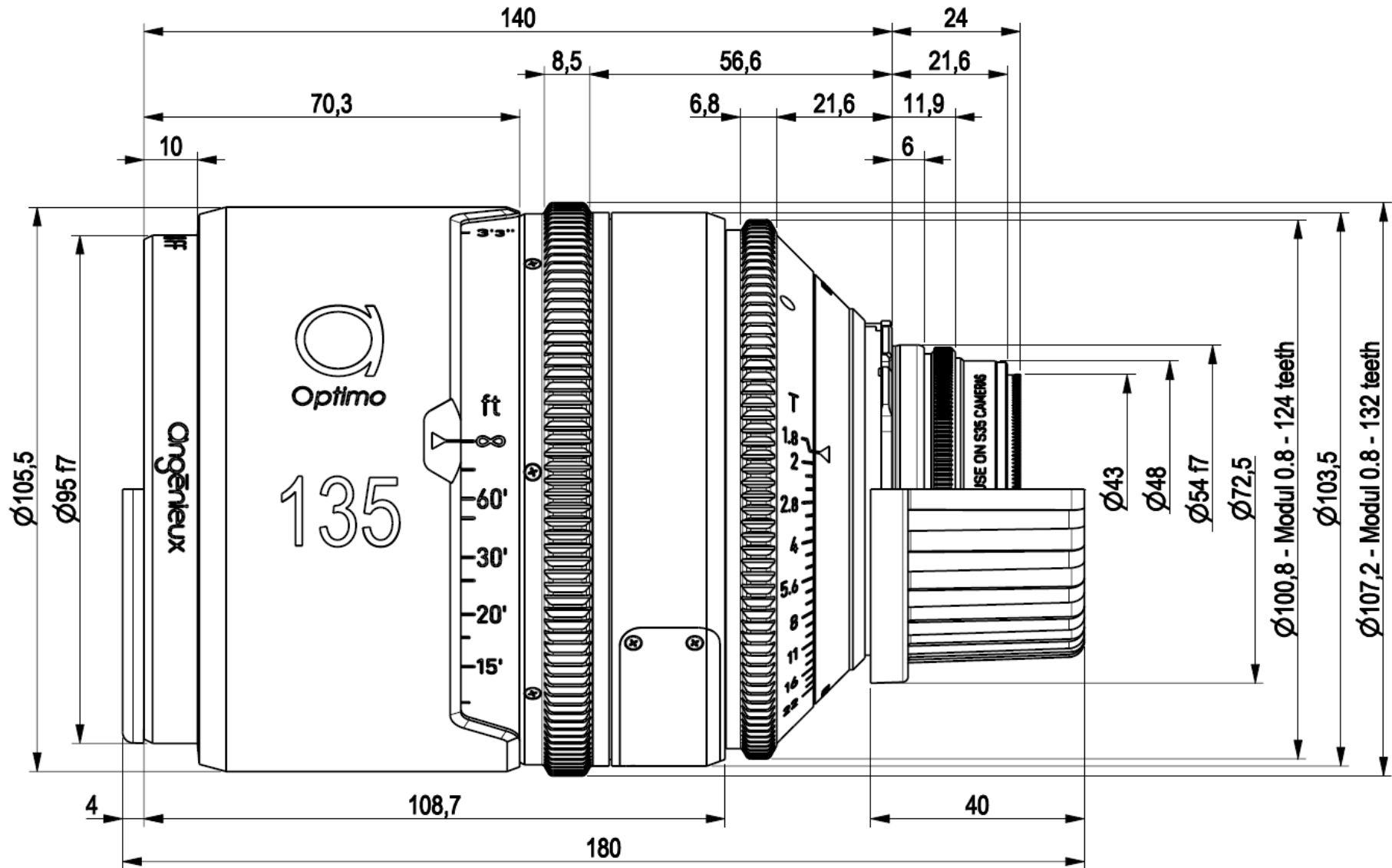


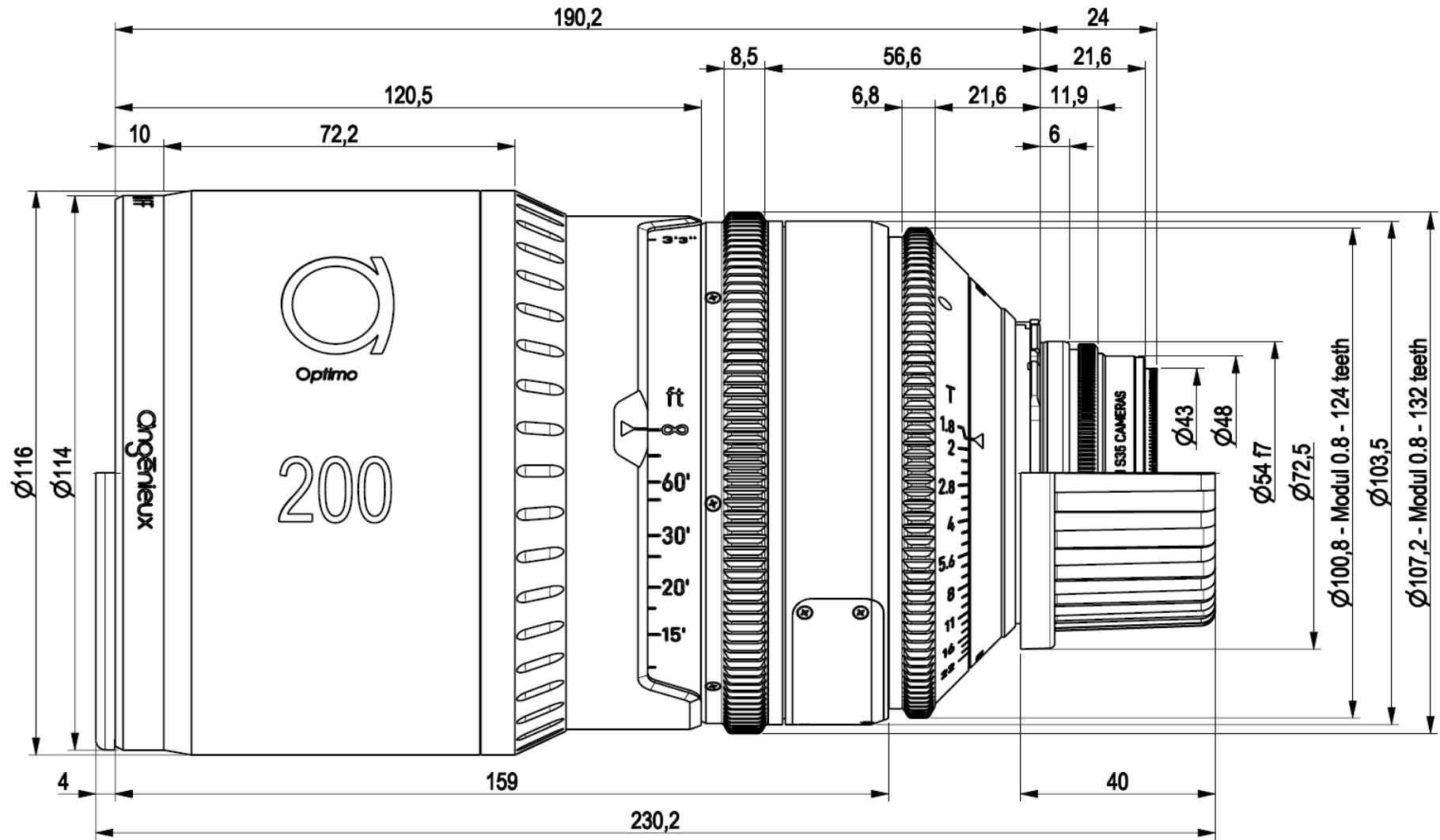












10 – Engraving distances detail

F18 to F40			F50			F60			F75		
FEET			FEET			FEET			FEET		
Engraving	Feet	Inch	Engraving	Feet	Inch	Engraving	Feet	Inch	Engraving	Feet	Inch
--oo	Infinity	0	--oo	Infinity	0	--oo	Infinity	0	--oo	Infinity	0
--	60	0	--	60	0	--	60	0	--	120	0
--30'	30	0	--30'	30	0	--30'	30	0	--60'	60	0
-	22	6	-	22	6	-	22	6	--	45	0
--15'	15	0	--15'	15	0	--15'	15	0	--30'	30	0
-	12	6	-	12	6	-	12	6	--	25	0
--10'	10	0	--10'	10	0	--10'	10	0	--20'	20	0
--	9	0	--	9	0	--	9	0	-	17	6
--	8	0	--8'	8	0	--8'	8	0	--15'	15	0
--	7	0	--	7	0	--	7	0	-	12	6
--6'	6	0	--6'	6	0	--6'	6	0	--10'	10	0
-	5	6	-	5	6	-	5	6	--	9	0
--5'	5	0	--5'	5	0	--5'	5	0	--8'	8	0
-	4	6	-	4	6	-	4	6	-	7	6
--4'	4	0	--4'	4	0	--4'	4	0	--7'	7	0
-	3	9	-	3	9	-	3	9	-	6	6
-3'6"	3	6	-3'6"	3	6	-3'6"	3	6	--6'	6	0
-	3	3	-	3	3	-	3	3	-	5	9
--3'	3	0	--3'	3	0	--3'	3	0	-5'6"	5	6
-	2	10	-	2	10	-	2	10	-	5	3
-	2	8	-	2	8	-	2	8	--5'	5	0
-2'6"	2	6	-2'6"	2	6	-2'6"	2	6	-	4	9
-	2	5	-	2	5	-	2	5	-4'6"	4	6
-	2	4	-	2	4	-	2	4	-	4	3
-2'3"	2	3	-2'3"	2	3	-2'3"	2	3	--4'	4	0
-	2	2	-	2	2	-	2	2	-	3	10
-	2	1	-	2	1	-	2	1	-	3	8
--2'	2	0	--2'	2	0	--2'	2	0	-3'6"	3	6
-	1	11	-	1	11	-	1	11	-	3	4
-	1	10	-	1	10	-	1	10	-	3	2
-1'9"	1	9	-1'9"	1	9	-	1	9	--3'	3	0
-	1	8	-	1	8	-1'8"	1	8	-	2	11
-	1	7	-	1	7	-	1	7	-	2	10
-1'6"	1	6	-1'6"	1	6	-1'6"	1	6	-2'9"	2	9
•	1	5,5	•	1	5,5	•	1	5,5	-	2	8
-1'5"	1	5	-1'5"	1	5	-1'5"	1	5	-	2	7
•	1	4,5	•	1	4,5	•	1	4,5	-2'6"	2	6
-1'4"	1	4	-1'4"	1	4	-1'4"	1	4	-	2	5
•	1	3,5							-	2	4
-1'3"	1	3							-2'3"	2	3
•	1	2,5							-	2	2
-1'2"	1	2							-	2	1
									--2'	2	0

F100			F135			F200		
FEET			FEET			FEET		
Engraving	Feet	Inch	Engraving	Feet	Inch	Engraving	Feet	Inch
--oo	Infinity	0	--oo	Infinity	0	--oo	Infinity	0
--	120	0	--	120	0	--	120	0
--60'	60	0	--60'	60	0	--60'	60	0
--	45	0	--	45	0	--	45	0
--30'	30	0	--30'	30	0	--30'	30	0
--	25	0	--	25	0	--	25	0
--20'	20	0	--20'	20	0	--20'	20	0
-	17	6	-	17	6	-	17	6
--15'	15	0	--15'	15	0	--15'	15	0
-	12	6	-	12	6	-	12	6
--10'	10	0	--10'	10	0	--10'	10	0
--	9	0	--	9	0	--	9	0
--8'	8	0	--8'	8	0	--8'	8	0
-	7	6	-	7	6	-	7	6
--7'	7	0	--7'	7	0	--7'	7	0
-	6	6	-	6	9	-	6	9
--6'	6	0	--6'6"	6	6	--6'6"	6	6
-	5	9	-	6	3	-	6	3
-5'6"	5	6	--6'	6	0	--6'	6	0
-	5	3	-	5	9	-	5	9
--5'	5	0	-5'6"	5	6	-5'6"	5	6
-	4	9	-	5	3	-	5	3
-4'6"	4	6	--5'	5	0	--5'	5	0
-	4	3	-	4	10	-	4	10
--4'	4	0	-	4	8	-	4	8
-	3	10	-4'6"	4	6	-4'6"	4	6
-	3	8	-	4	4	-	4	5
-3'6"	3	6	-	4	2	-	4	4
-	3	4	--4'	4	0	-4'3"	4	3
-	3	2	-	3	11	-	4	2
--3'	3	0	-	3	10	-	4	1
-	2	11	-3'9"	3	9	-4'	4	0
-	2	10	-	3	8			
-2'9"	2	9	-	3	7			
-	2	8	-3'6"	3	6			
-	2	7	-	3	5			
-2'6"	2	6	-	3	4			
			-3'3"	3	3			

F18 to F40

METERS	
Engraving	Meter
--oo	Infinity
--	20
--10	10
-	7,5
-5	5
--	4
-3	3
-	2,5
-2	2
-	1,75
-1.5	1,5
-	1,4
-1.3	1,3
-	1,2
-	1,1
-1	1
-	0,95
-9	0,9
-	0,85
-8	0,8
-	0,75
-7	0,7
-	0,675
-65	0,65
-	0,625
-6	0,6
-	0,575
-55	0,55
-	0,525
-5	0,5
-	0,475
-45	0,45
•	0,44
•	0,43
-42	0,42
•	0,41
-4	0,4
•	0,39
-38	0,38
•	0,37
-36	0,36

F50

METERS	
Engraving	Meter
--oo	Infinity
--	20
--10	10
-	7,5
-5	5
--	4
-3	3
-	2,5
-2	2
-	1,75
-1.5	1,5
-	1,4
-1.3	1,3
-	1,2
-	1,1
-1	1
-	0,95
-9	0,9
-	0,85
-8	0,8
-	0,75
-7	0,7
-	0,675
-65	0,65
-	0,625
-6	0,6
-	0,575
-55	0,55
-	0,525
-5	0,5
•	0,49
-48	0,48
•	0,47
-46	0,46
•	0,45
-44	0,44
•	0,43
•	0,42
-41	0,41

F60

METERS	
Engraving	Meter
--oo	Infinity
--	20
--10	10
-	7,5
-5	5
--	4
-3	3
-	2,5
-2	2
-	1,75
-1.5	1,5
-	1,4
-1.3	1,3
-	1,2
-	1,1
-1	1
-	0,95
-9	0,9
-	0,85
-8	0,8
-	0,75
-7	0,7
-	0,675
-65	0,65
-	0,625
-6	0,6
-	0,575
-55	0,55
•	0,54
-53	0,53
•	0,52
-51	0,51

F75

METERS	
Engraving	Meter
--oo	Infinity
--	40
--20	20
--	15
--10	10
--	8
--6	6
--5	5
-	4,5
--4	4
-	3,5
--3	3
-	2,75
--2.5	2,5
-	2,25
--2	2
-	1,9
-	1,8
--1.7	1,7
-	1,6
--1.5	1,5
-	1,45
--1.4	1,4
-	1,35
--1.3	1,3
-	1,25
--1.2	1,2
-	1,15
--1.1	1,1
-	1,05
--1	1
-	0,95
--9	0,9
-	0,85
--8	0,8
-	0,75
--7	0,7
-	0,65
--61	0,61

F100

METERS	
Engraving	Meter
--oo	Infinity
--	40
--20	20
--	15
--10	10
--	8
--6	6
--5	5
-	4,5
--4	4
-	3,5
--3	3
-	2,75
-2.5	2,5
-	2,25
--2	2
-	1,9
-	1,8
-1.7	1,7
-	1,6
-1.5	1,5
-	1,45
-1.4	1,4
-	1,35
-1.3	1,3
-	1,25
-1.2	1,2
-	1,15
-1.1	1,1
-	1,05
--1	1
-	0,95
-9	0,9
-	0,85
-8	0,8
-77	0,77

F135

METERS	
Engraving	Meter
--oo	Infinity
--	40
--20	20
--	15
--10	10
--	8
--6	6
--5	5
-	4,5
--4	4
-	3,5
--3	3
-	2,75
-2.5	2,5
-	2,25
--2	2
-	1,95
-1.9	1,9
-	1,85
-1.8	1,8
-	1,75
-1.7	1,7
-	1,65
-1.6	1,6
-	1,55
-1.5	1,5
-	1,45
-1.4	1,4
-	1,35
-1.3	1,3
-	1,25
-1.2	1,2
-	1,15
-1.1	1,1
-	1,05
--1	1

F200

METERS	
Engraving	Meter
--oo	Infinity
--	40
--20	20
--	15
--10	10
--	8
--6	6
--5	5
-	4,5
--4	4
-	3,5
--3	3
-	2,75
-2.5	2,5
-	2,25
--2	2
-	1,95
-1.9	1,9
-	1,85
-1.8	1,8
-	1,75
-1.7	1,7
-	1,65
-1.6	1,6
-	1,55
-1.5	1,5
-	1,45
-1.4	1,4
-	1,35
-1.3	1,3
-	1,25
-1.2	1,2

11 – Focal length MOD and ratio detail

Prime	MOD	Ratio
F18	1'2"	1:10
F21	1'2"	1:10
F24	1'2"	1:9
F28	1'2"	1:8
F32	1'2"	1:6
F40	1'2"	1:5
F50	1'4"	1:5
F60	1'8"	1:6
F75	2'	1:6
F100	2'6"	1:6
F135	3'3"	1:6
F200	4'	1:5