

# InfiniVar CFM-2/S™ Continuously-Focusable Microscope



**INFINITY** Photo-Optical Company • *Manufacturers of precision optical instruments.*

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## **InfiniVar CFM-2/S™ Continuously-Focusable Microscope and Reverso™**

**General Description.** The original winner of both the R&D 100 and Photonics Circle of Excellence awards in the same year has been brought to a new level of performance. InfiniVar CFM-2/S is now infinity-corrected and can be optionally equipped for the REVERSO macro mode (see below). When configured in REVERSO, the InfiniVar CFM-2/S becomes a CentriTel™ system. CentriTel is Infinity's trademark for its internal focusing optical systems which can maintain essentially constant magnification during focal translation--all the while doing so from a fixed, chosen working distance. In addition, its resolution has been increased c.25% over the previous model. Infinity-correction and increased resolution combine to make the InfiniVar CFM-2/S the most versatile and comprehensive video microscope available.

Continuously-focusable from infinity down to 18mm, the InfiniVar CFM-2/S attains 9x primary magnification at its closest focus and, at 60mm, provides 1x primary magnification on-sensor. Consequently, a movement of only 40mm equals a 9:1 zero-in ratio. Moving InfiniVar CFM-2/S out further, a 36:1 zero-in ratio is possible from 200mm down to 18mm. Such adaptability allows the depth of field and magnification to be combined for the best overall effects. InfiniVar CFM-2/S lets you select the magnification, working distance, stand-off, resolution and depth of field you wish—for a totally new experience in video microscopy.

InfiniVar CFM-2/S is composed of an Optics Module (which contains all of its lens elements), Spacer Tubes [with international "T" thread (M42 x 0.75)] and a Mounting Clamp. Two ganged T-24 Tubes or one T-24mm Tube and a Stereomicroscope Stand Adapter are attached to the Optics Module, ending in a T-58 Tube. Usually, a C-mount is added in back of the T-58 Tube, but T-2 Adapters (e.g., "F"-mounts) can also be used in this position. Once connected to a video/photo adapter and camera, InfiniVar CFM-2/S is ready for use.

On InfiniVar CFM-2/S' front Optics Module is a section that looks like a standard microscope objective. This part is topped with a 28mm diameter flange, permitting fiber optic ring illuminators of that diameter to be attached. This flange also has a mounting depression which mates with the three setscrews of the 66mm Ring Light Adapter. Below the flange, a black metal Sheath protects the CFM-2/S' inner lens elements. If the Sheath is carefully unscrewed, it can be exchanged with the (optional) Plastic Probe Tip. The Plastic Probe Tip permits mounting 21mm fiber optic ring lights around it. By moving a 21mm ring light up and down the Plastic Probe Tip's shaft, continuous transition from brightfield to darkfield can be set at close ranges. This accessory is particularly useful for edge detection of parts.

Two top Cap Lenses are provided with each InfiniVar CFM-2/S: Standard (STL) and Compressor (CTL). Both Cap Lenses screw into the rear of the Main Body and are conveniently user-interchangeable. The STL Lens provides the full range of 0-9x, while the CTL Lens (used with T-58 Tube removed) provides 0-5x. The CTL's range is particularly useful for image processing at the highest possible resolution with larger objects or smaller format (2/3-in. and less) sensors. In this way, the InfiniVar CFM-2/S is uniquely able to match the resolution to the pixels of various camera formats. In effect, the "lithography" of the resolution (the size of the Airy patterns) can be matched to camera pixels and format simply by using either the STL or CTL lenses. The results are images of outstanding quality.

**DSLR and Large Format Use.** The InfiniVar CFM-2/S can be used with virtually all DSLR and large sensed cameras up to and including the 35mm format (24x36mm; 43mm horizontal) by interfacing the IVR Tube (optical component) between camera mount and T58 Tube (see drawing). This also means that the latest 4/3-in "E-mount" cameras can be used as well, provided the proper T to E adapter is employed. When the IVR Tube is interfaced, one of the T24 Tubes is removed (see drawing). The added length of the total system is then only 6mm more than if the IVR Tube were not used. The total range of the InfiniVar CFM-2/S remains the same, except the addition of the IVR Tube results in the range being 0-15x.

**Magnification and Working Distance.** Please see the InfiniVar CFM-2/S data table for specific details of InfiniVar CFM-2/S' optical characteristics. However, when used with the standard objective at 19mm working distance, the InfiniVar CFM-2/S attains 9x primary magnification and, at 60mm, 1x primary magnification on-sensor. Consequently, a movement of only 42mm equals an 9:1 zero-in ratio! Moving InfiniVar CFM-2/S out further, a 36:1 zero-in ratio is possible from 220mm down to 19mm. This adaptability allows the depth of field and magnification to be combined for the best overall effects. This let's YOU select the magnification, working distance, stand-off and depth of field you wish.

\**Multiply* magnification by 1.15 for 15-inch monitors; 1.46 for 19-inch monitors and 1.92 for 25-inch monitors. Magnifications and fields may vary *slightly*, due to absence of video standards among camera/monitor manufacturers.

**REVERSO.** The Standard Mode is only ONE of the InfiniVar CFM-2/S configurations. The other is, literally, 180-degrees opposite: REVERSO. InfiniVar CFM-2/S can be FLIPPED and reconfigured for REVERSO mode. All that is required to convert from Standard to REVERSO mode is to add the REVERSO Tube and mount the REVERSO Tube Lens in place of STL or CTL Tube Lenses. In REVERSO, the InfiniVar CFM-2/S can be focused from infinity down to 20mm at 1.4x macro—with incredible magnification stability throughout focal translation up or down from any original point of focus. This is CentriTel: Infinity's unique system which maintains essential magnification while the focus can be translated from any fixed, chosen working distance. CentriTel makes REVERSO mode ideal. This makes the REVERSO mode ideal for "montage" and other high depth of field techniques as well as critical measurements of industrial objects from fixed positions.

**Accessorization.** Dual-port and 50/50 Beamsplitter options allow up to two different cameras or other rear tubes to be utilized on the InfiniVar CFM-2/S. Amplifiers can be added for C-mount (DL 2x and LDL-lockable 2x) or, for universal format use the IVR Tube. Please see the Price List for the ongoing accessorization program which defines the InfiniVar CFM-2/S as a true SYSTEM instrument.

**Mountings.** InfiniVar CFM-2/S is supplied with a Mounting Clamp with 1/4-20 central tap and two "outboard" M4 (metric) taps. This permits mounting InfiniVar CFM-2/S on any stand, tripod, custom assembly or jig which provides such threads. In addition, InfiniVar CFM-2/S can be mounted on most major-brand stereomicroscope stands by *substituting the appropriate* Stereomicroscope Stand Mount for ONE T24 tube and the Mounting Clamp which surrounds it.

Stereomicroscope Stand Mounts are all standardized to be 24mm thick in optical tubelength. Consequently, to mount InfiniVar CFM-2/S on any major-brand stereomicroscope stand, *remove* ONE T24 tube and the Mounting Clamp and *replace* it with the suitable Stand Mount. The remaining T24 tube can be repositioned above or below the Stand Mount to establish the desired "zero-in" range.

**Camera Orientation.** InfiniVar CFM-2/S provides an erect image to the video sensor. Your camera and InfiniVar CFM-2 should be rotated in the Clamp or Stand Mount, accordingly.

**Amplifiers.** InfiniVar CFM-2/S' magnification may be amplified by adding the 2x DL Power Module Amplifier Tube. Yet, the DL Tube adds only 12mm to InfiniVar CFM-2/S' overall length. The LDL Power Module Amplifier is optically identical but also permits 360° orientation and camera locking at a selected position.

**Illumination.** InfiniVar CFM-2/S functions best when the object is evenly illuminated. Fiber optic light guides and table-top halogen illuminators are recommended. Nicholas-type stereomicroscope illuminators are also well-suited. InfiniVar CFM-2/S' light efficiency is high enough to allow the use of separate illuminators. As already noted, InfiniVar CFM-2/S can be equipped with 21mm, 28mm and 66mm fiber optic illuminators. When Plastic Probe Tips are used with 21mm ring lights, brightfield and darkfield effects can be set at close ranges by sliding the illuminator up and down the Probe's shaft.

**Care and Cleaning.** InfiniVar CFM-2/S should be treated as the fine optical instrument it is. Care should be taken to keep dust and dirt off external surfaces. If the objective front should ever need to be cleaned, use lens tissue moistened by a lens cleaner. NEVER USE SOLVENTS of any kind. InfiniVar CFM-2/S' Optics Module should NEVER be opened. If contaminants enter any inner parts, consult your dealer or INFINITY about cleaning services.

**Warranty Service and Questions.** Specific details of the warranty are given on the limited warranty statement. In general, all parts and labor are guaranteed for one full year. Should InfiniVar CFM-2/S become damaged or need service, return it to your authorized dealer with a letter explaining the problem. If you have additional questions, please do not hesitate to contact your dealer or INFINITY PHOTO-OPTICAL COMPANY directly.

# Video Formats

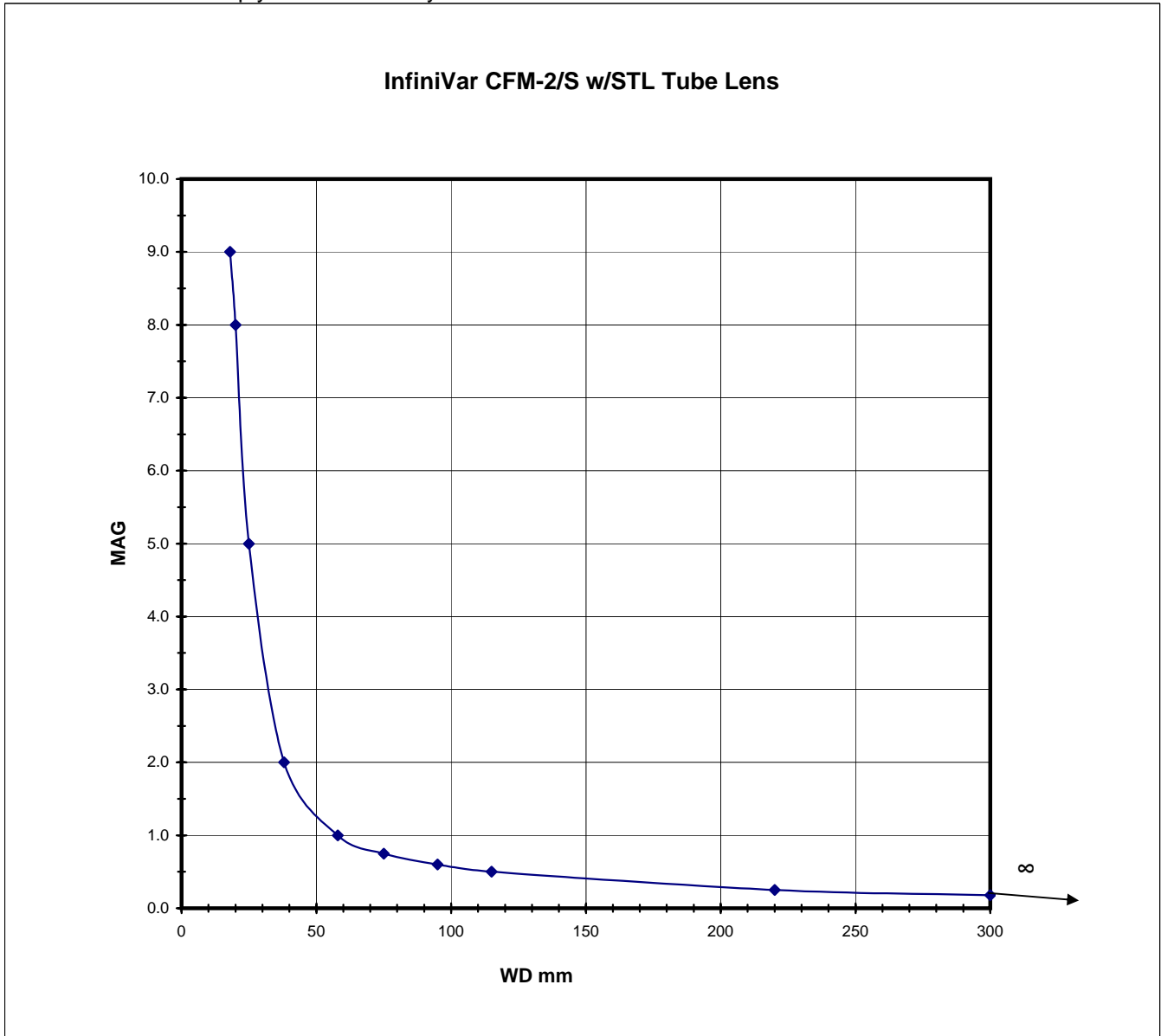
Format	Factor	Diagram
1/4"	0.5	
1/3"	0.75	
1/2"	1.0	
2/3"	1.375	
1"	2.0	

Unless otherwise noted all data is given for 1/2" camera sensors. For FOV or magnification in other sensor sizes use the factors listed. For example, a FOV of 25mm listed for a 1/3" camera would be  $25 \times 0.75 = 18.75\text{mm}$ .

# INFINIVAR CFM-2/S w/STL TUBE LENS OPTICAL DATA

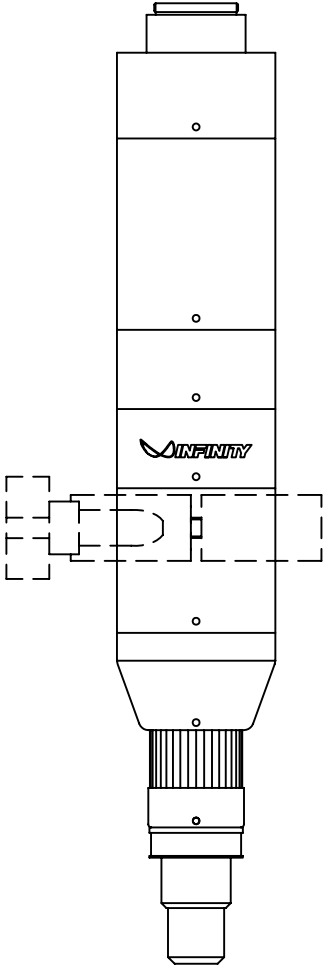
<b>WD mm</b>	18	20	25	38	58	75	95	115	220	300
<b>Mag</b>	9.0	8.0	5.0	2.0	1.0	0.75	0.6	0.5	0.25	0.18
<b>FOV</b>	0.7	0.8	1.3	3.2	6.4	8.5	10.7	12.8	25.6	35.6

\*FOV based on 1/2" video format (6.4mm horizontally). See Video Format Page for all conversions.  
 For 1/3" sensors multiply FOV in chart by 0.75 for new 1/3" FOV.

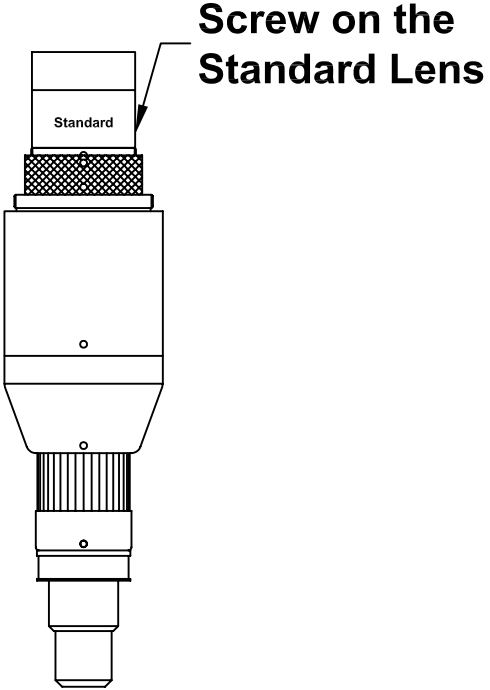


# InfiniVar CFM-2/S™ Standard Lens Instructions

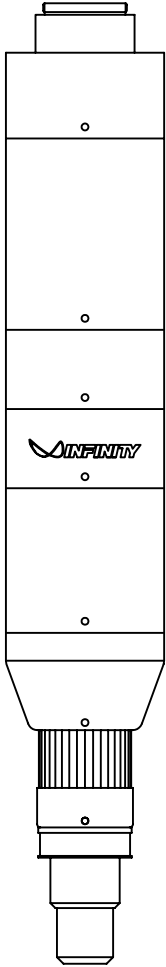
## InfiniVar CFM-2/S



**STEP 1**



**STEP 2**

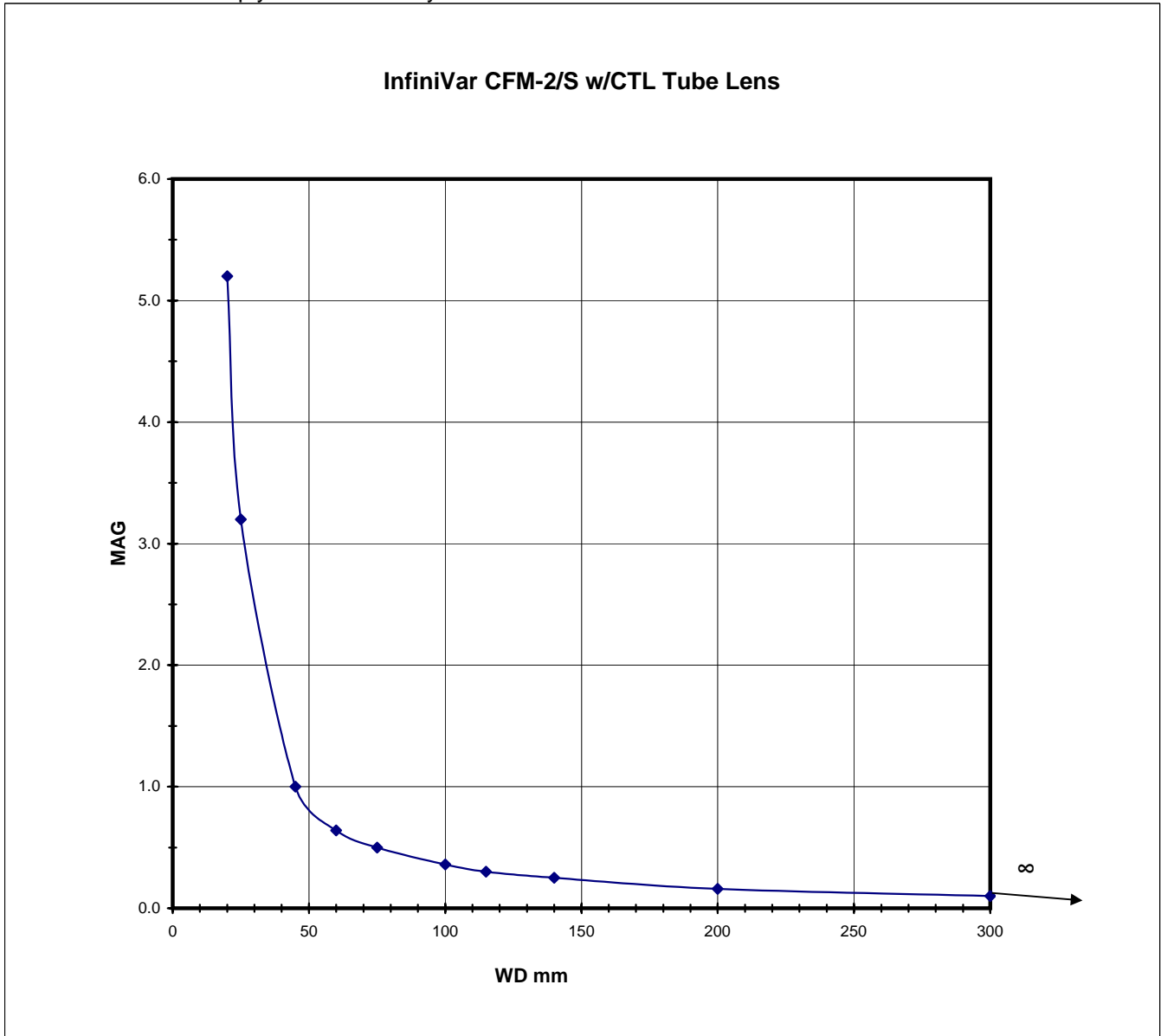


**STEP 3**

# INFINIVAR CFM-2/S w/CTL TUBE LENS OPTICAL DATA

<b>WD mm</b>	20	25	45	60	75	100	115	140	200	300
<b>Mag</b>	5.2	3.2	1.0	0.6	0.5	0.36	0.3	0.25	0.16	0.10
<b>FOV</b>	1.2	2.0	6.4	10.0	12.8	17.8	21.3	25.6	40.0	64.0

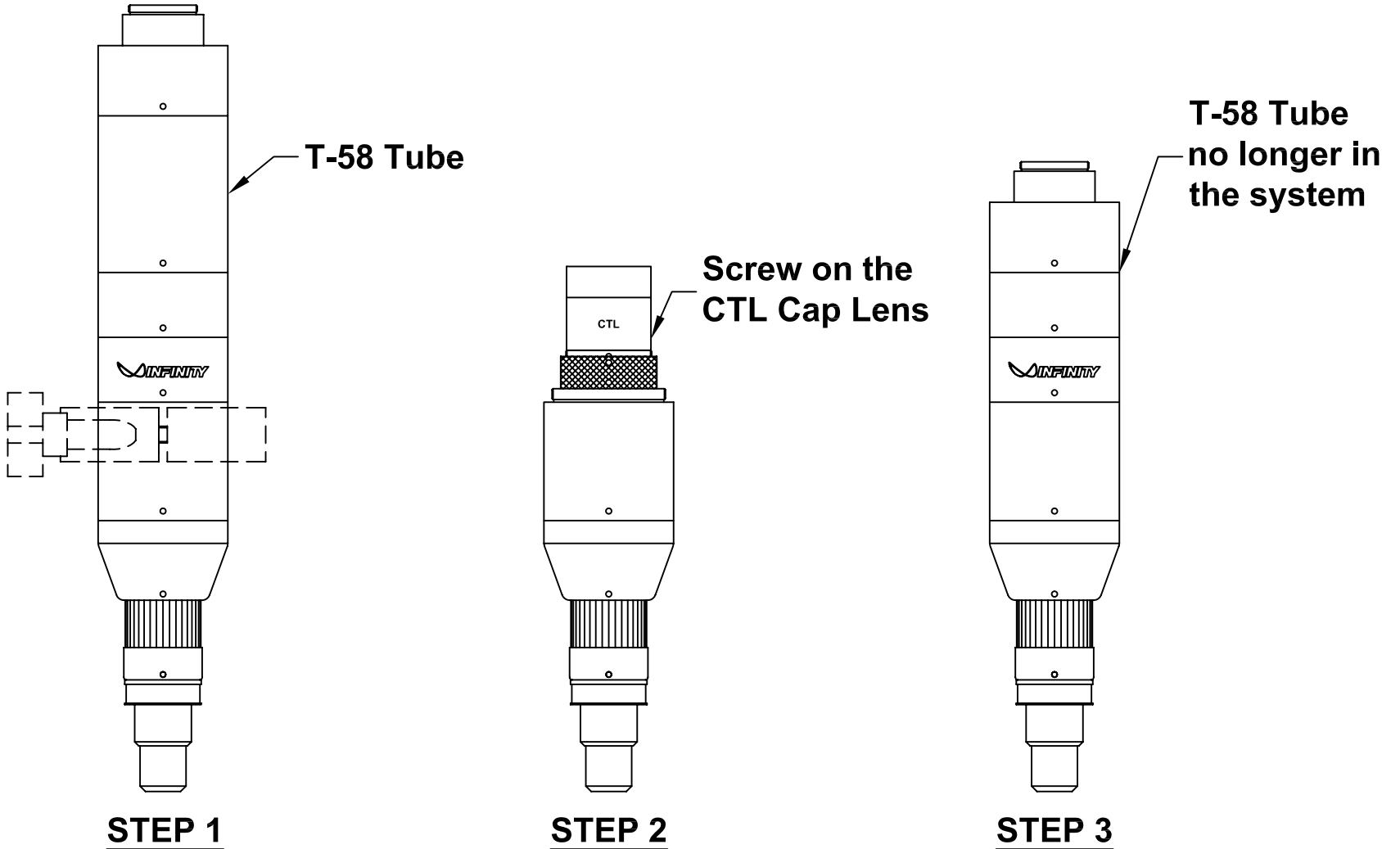
\*FOV based on 1/2" video format (6.4mm horizontally). See Video Format Page for all conversions.  
 For 1/3" sensors multiply FOV in chart by 0.75 for new 1/3" FOV.





# InfiniVar CFM-2/S™ CTL Instructions

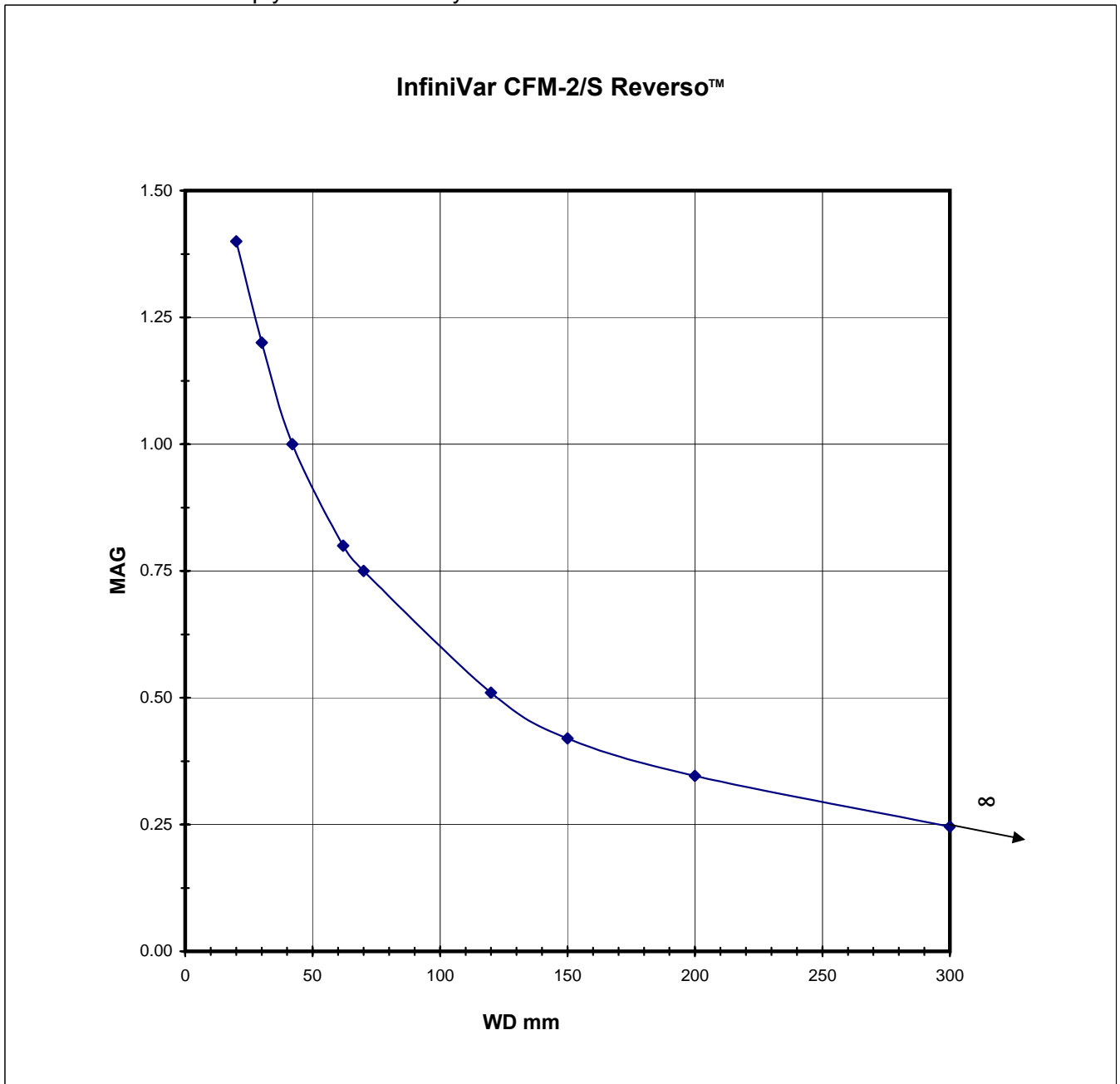
InfiniVar CFM-2/S



# INFINIVAR CFM-2/S REVERSO™ OPTICAL DATA

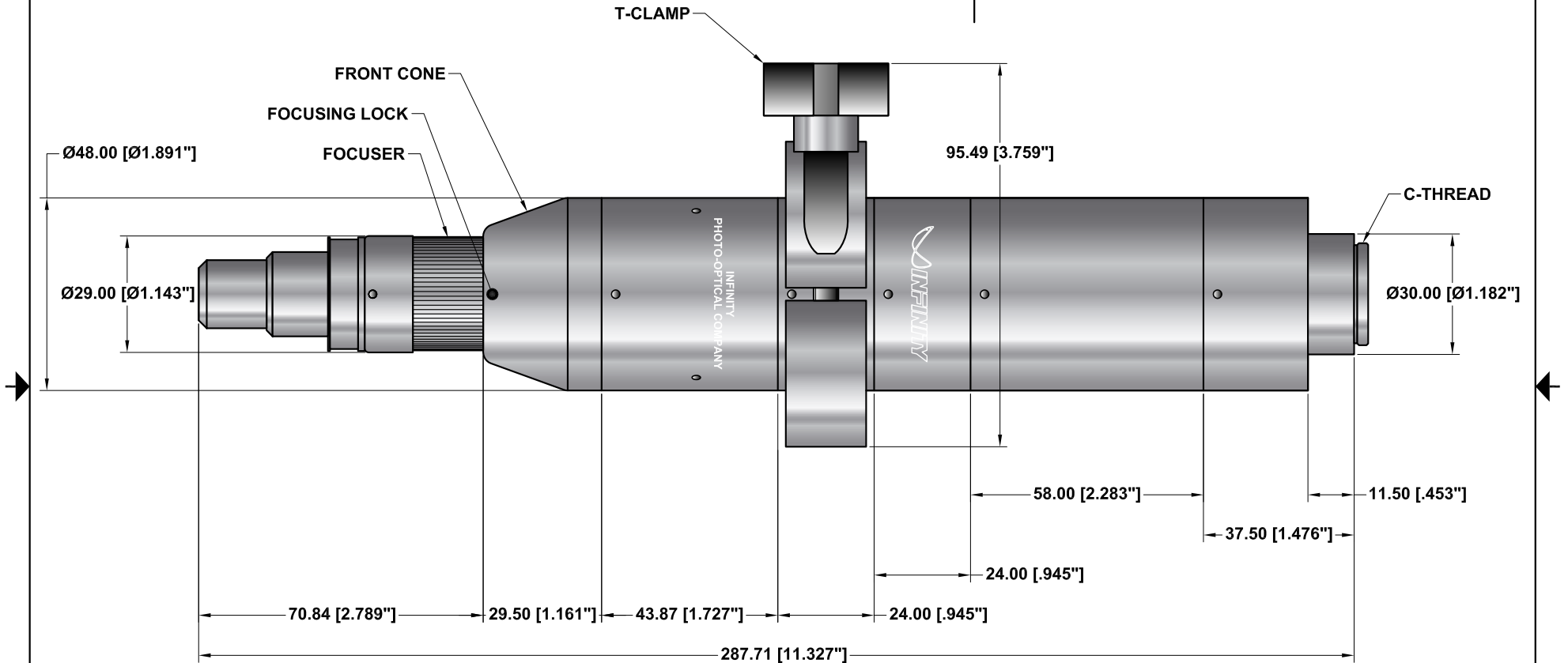
<b>WD mm</b>	20	30	42	62	70	120	150	200	300
<b>Mag</b>	1.40	1.20	1.00	0.80	0.75	0.51	0.42	0.35	0.25
<b>FOV</b>	4.6	5.3	6.4	8	8.5	12.5	15.2	18.5	26.0

\*FOV based on 1/2" video format (6.4mm horizontally). See Video Format Page for all conversions. For 1/3" sensors multiply FOV in chart by 0.75 for new 1/3" FOV.

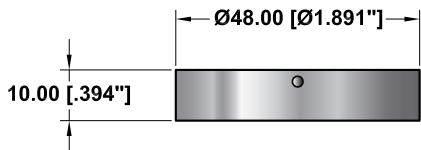


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REVISIONS				
ZONE	REV	DESCRIPTION	DATE	APPROVED



SUPPLEMENTAL LD OBJECTIVE



FRONT REVERSING RING

ALL DIM ARE mm  
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REFERENCE ONLY AND  
ARE SUBJECT TO  
CHANGE.

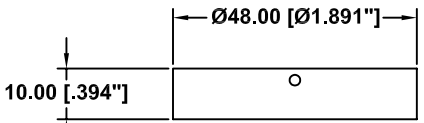
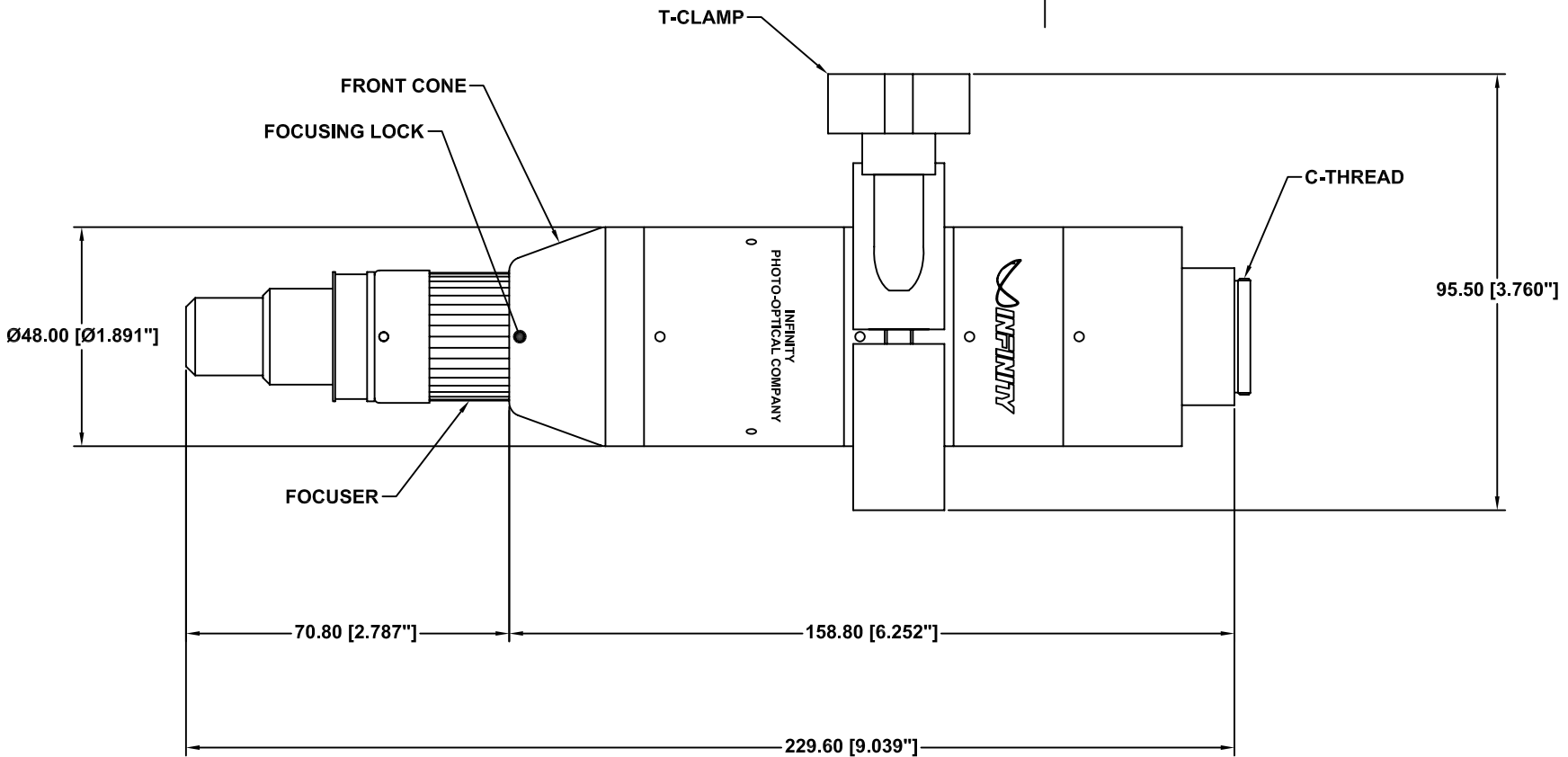
**INFINITY** Photo-Optical Company  
2530 Frontier Ave., Boulder, CO 80301  
303/440-4544 Fax 303/440-4144

**INFINIVAR™ CFM-2/S STANDARD  
CONFIGURATION**

Date: 09/29/03 MB	SIZE B	FSCM NO.	DWG NO. -	REV C
Modified: 01/19/05 MB	SCALE NONE	-	SHEET 1 OF 1	

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REVISIONS				
ZONE	REV	DESCRIPTION	DATE	APPROVED



FRONT REVERSING RING

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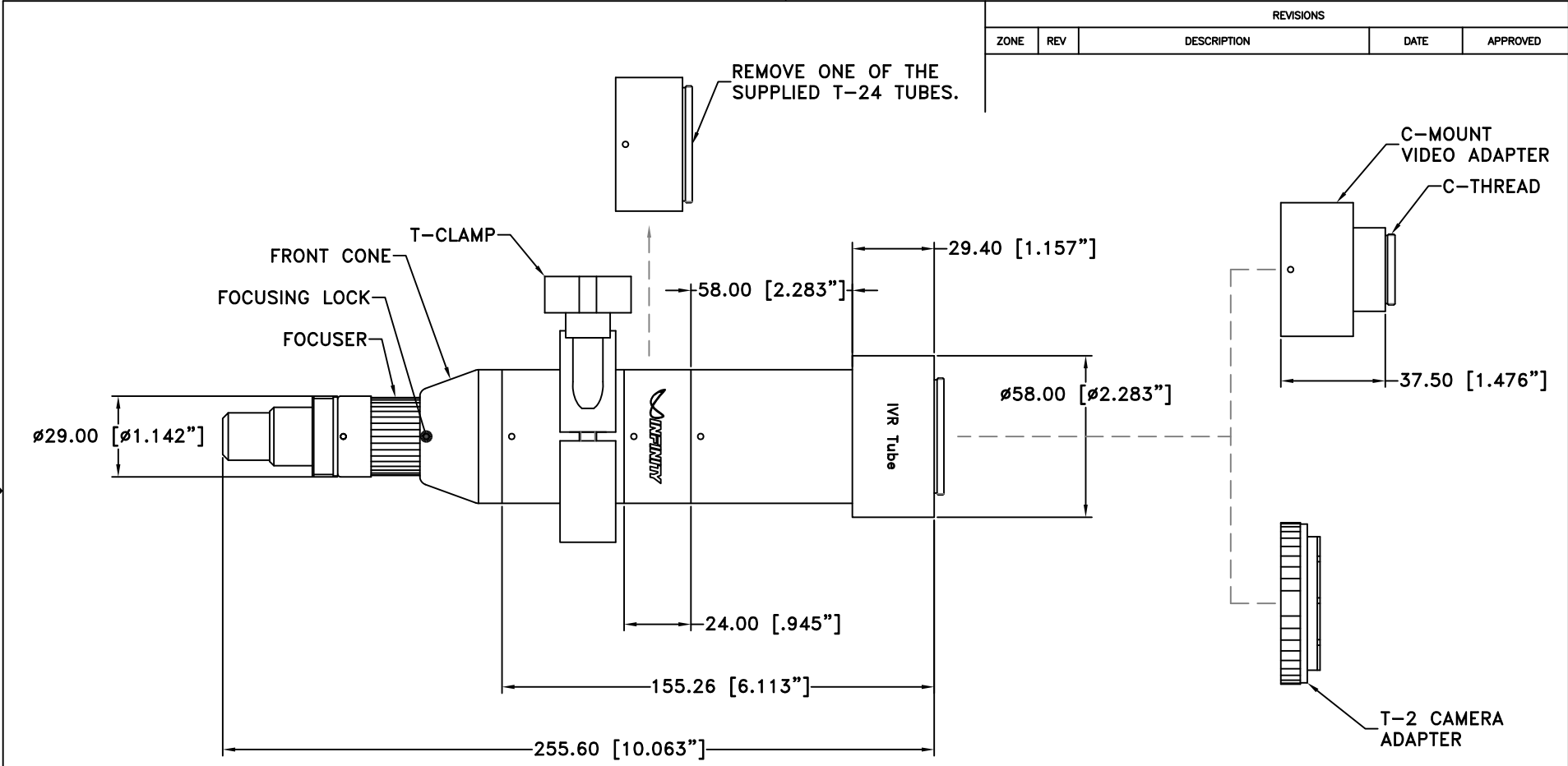
Date: 09/26/06 MB

Modified:

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**INFINIVAR™ CFM-2/S WITH CTL**

SIZE <b>B</b>	FSCM NO.	DWG NO. -	REV -
SCALE <b>NONE</b>	-	SHEET <b>1 OF 1</b>	



REVISIONS				
ZONE	REV	DESCRIPTION	DATE	APPROVED

ALL DIM ARE mm [inches] AND ARE FOR REFERENCE ONLY AND ARE SUBJECT TO CHANGE.

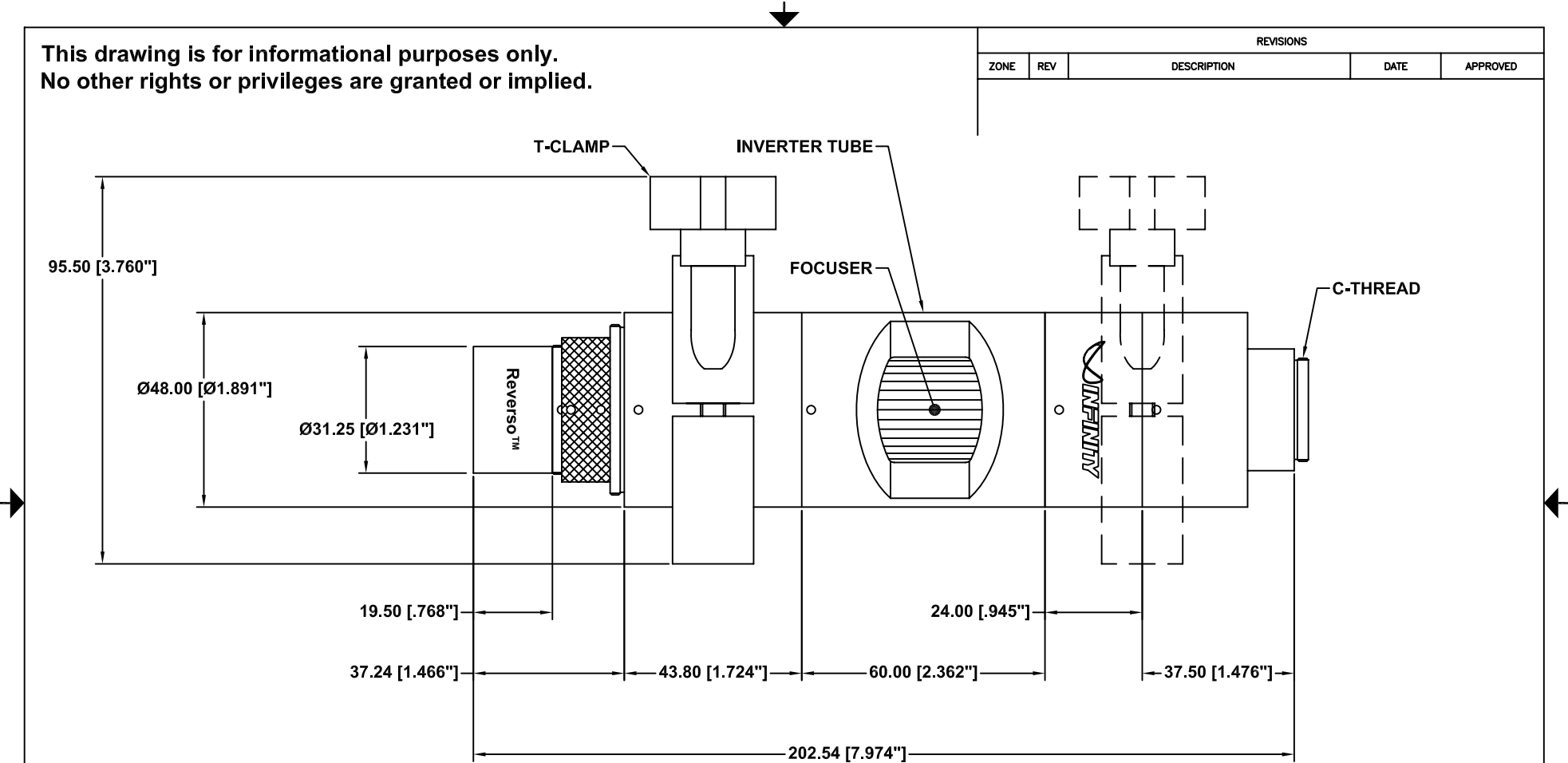
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 303/440-4544 Fax 303/440-4144

**INFINIVAR™ CFM-2/S WITH IVR TUBE**

Date: 10/27/10 MB	SIZE B	FSCM NO.	DWG NO. -	REV -
Modified:	SCALE NONE	-	SHEET 1 OF 1	

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ZONE	REV	DESCRIPTION	DATE	APPROVED



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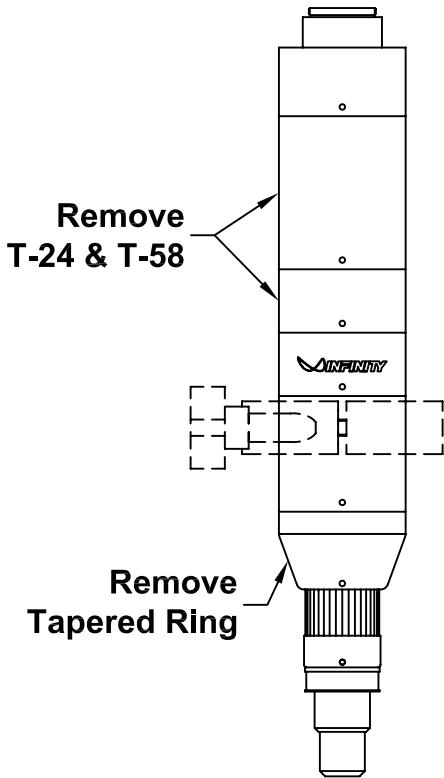
**INFINITY** Photo-Optical Company  
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 303/440-4544 Fax 303/440-4144

**INFINIVAR™ CFM-2/S**  
**REVERSO™**

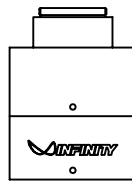
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Modified: 09/19/06 MB	SCALE NONE	-	SHEET 1 OF 1	

# InfiniVar CFM-2/S™ REVERSO™ Instructions

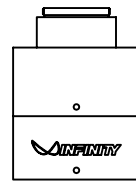
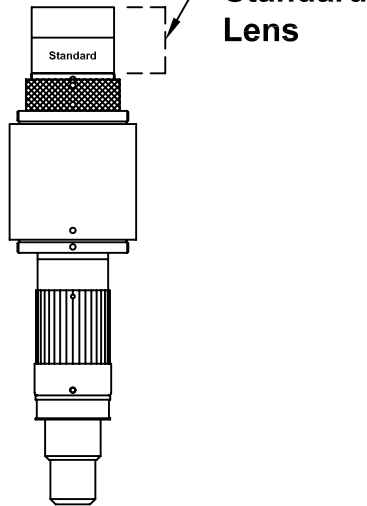
InfiniVar CFM-2/S



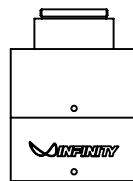
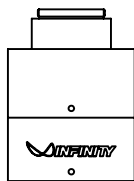
**STEP 1**



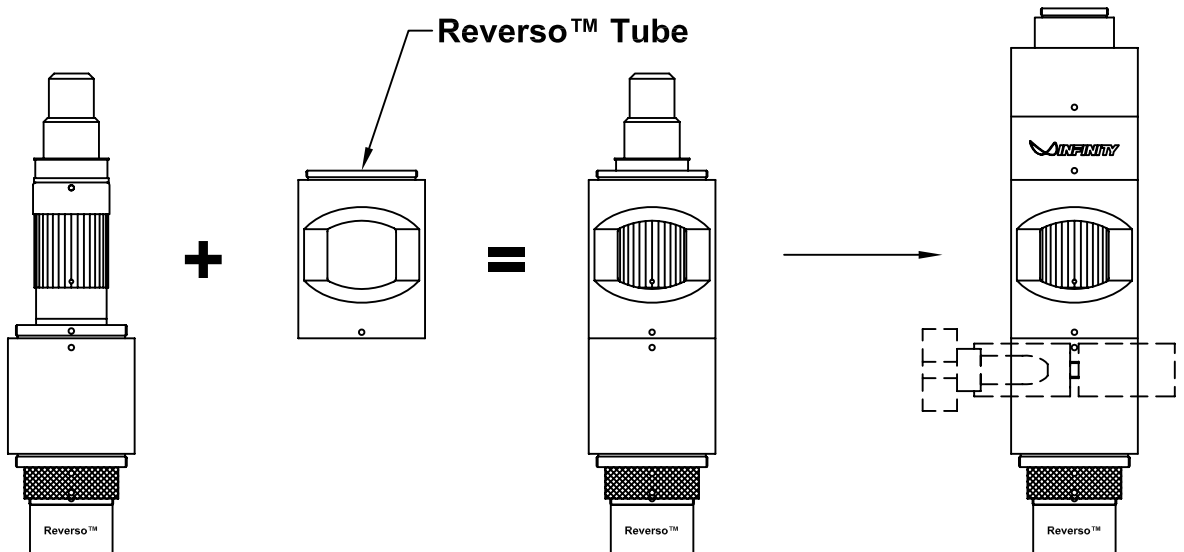
**STEP 2**



**STEP 3**



InfiniVar CFM-2/S  
REVERSO™

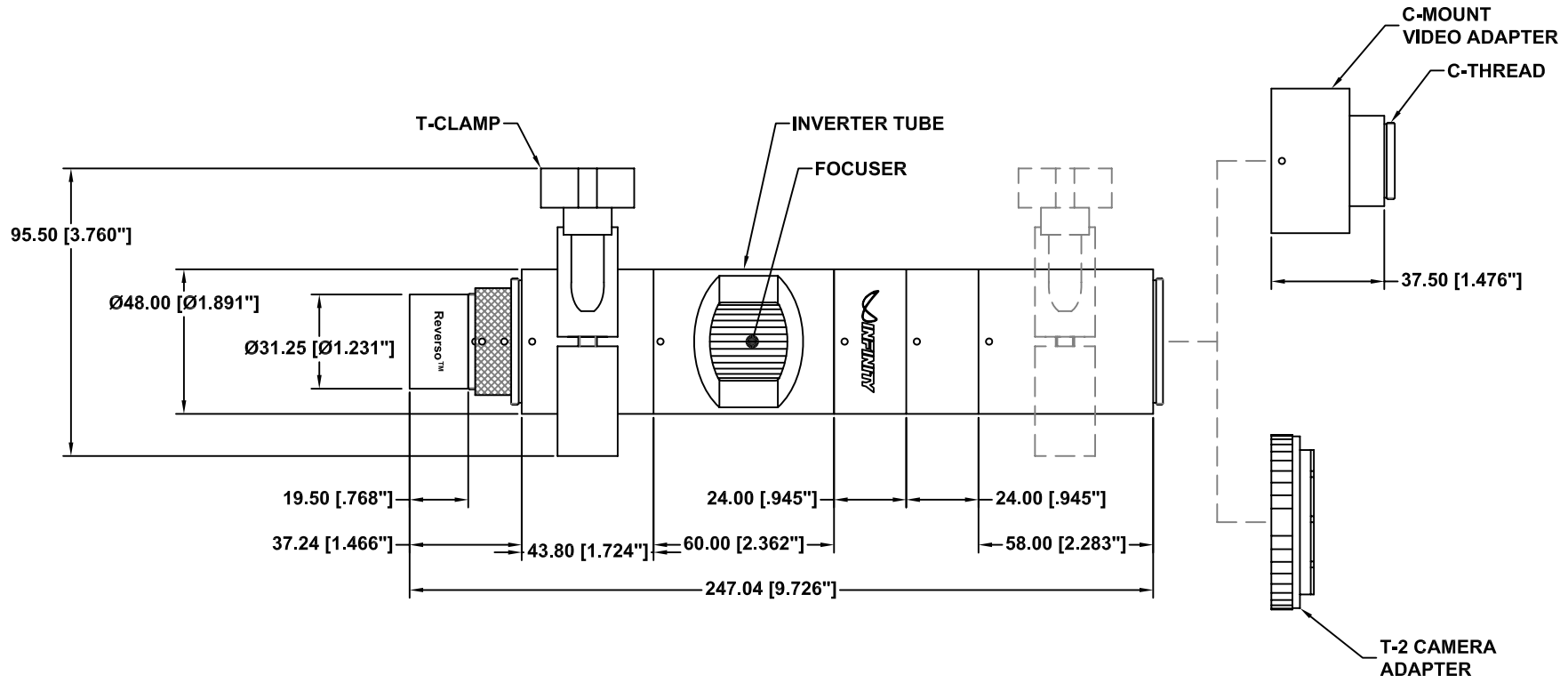


**STEP 4**

**STEP 5**

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REVISIONS				
ZONE	REV	DESCRIPTION	DATE	APPROVED



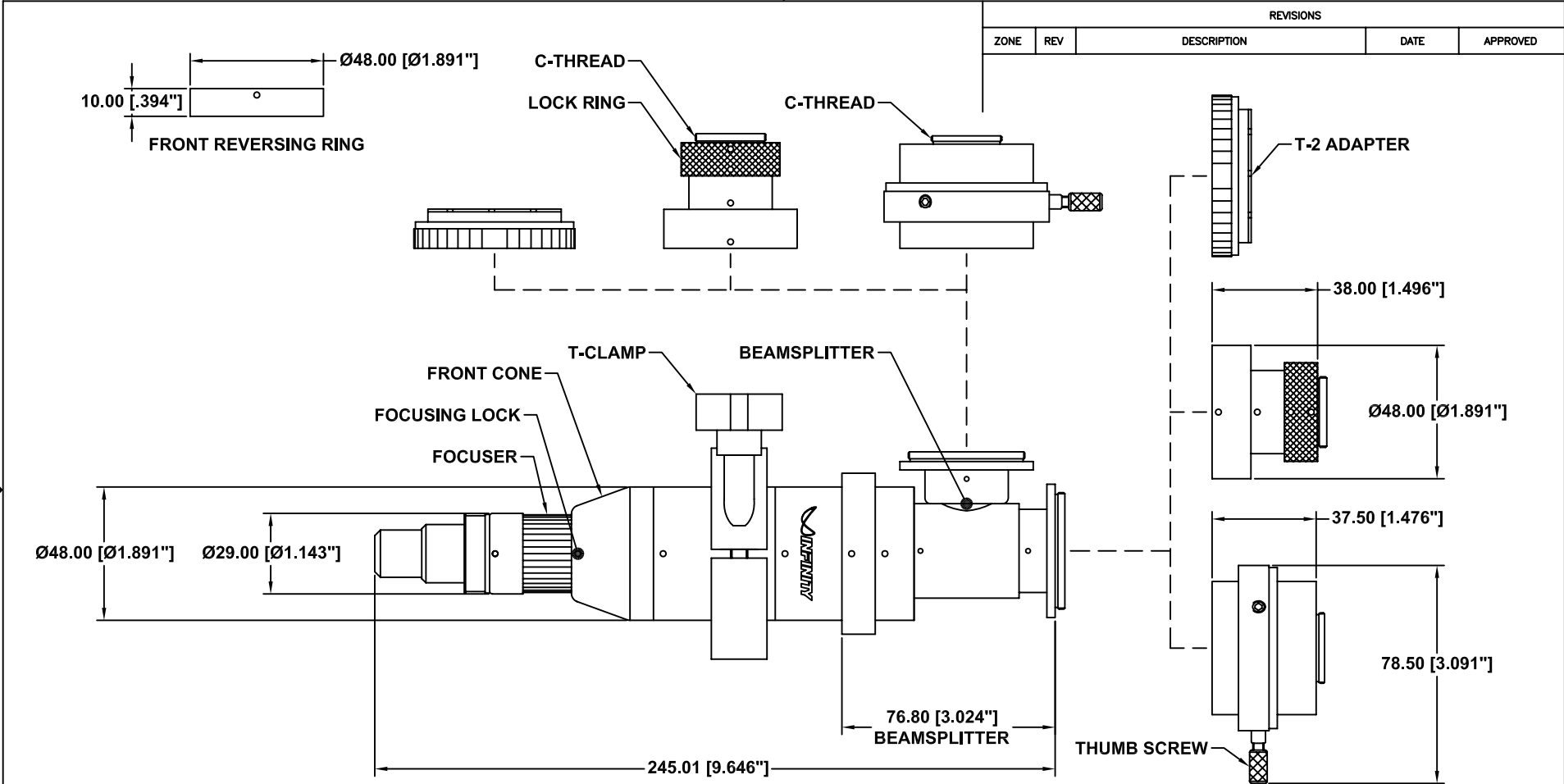
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**INFINIVAR™ CFM-2/S  
REVERSO™ LARGE FORMAT**

Date: 06/08/09 MB	SIZE <b>B</b>	FSCM NO.	DWG NO. -	REV -
Modified:	SCALE <b>NONE</b>	-	SHEET <b>1 OF 1</b>	





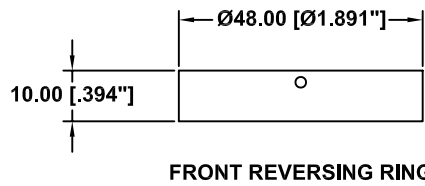
REVISIONS				
ZONE	REV	DESCRIPTION	DATE	APPROVED

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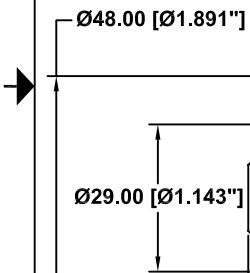
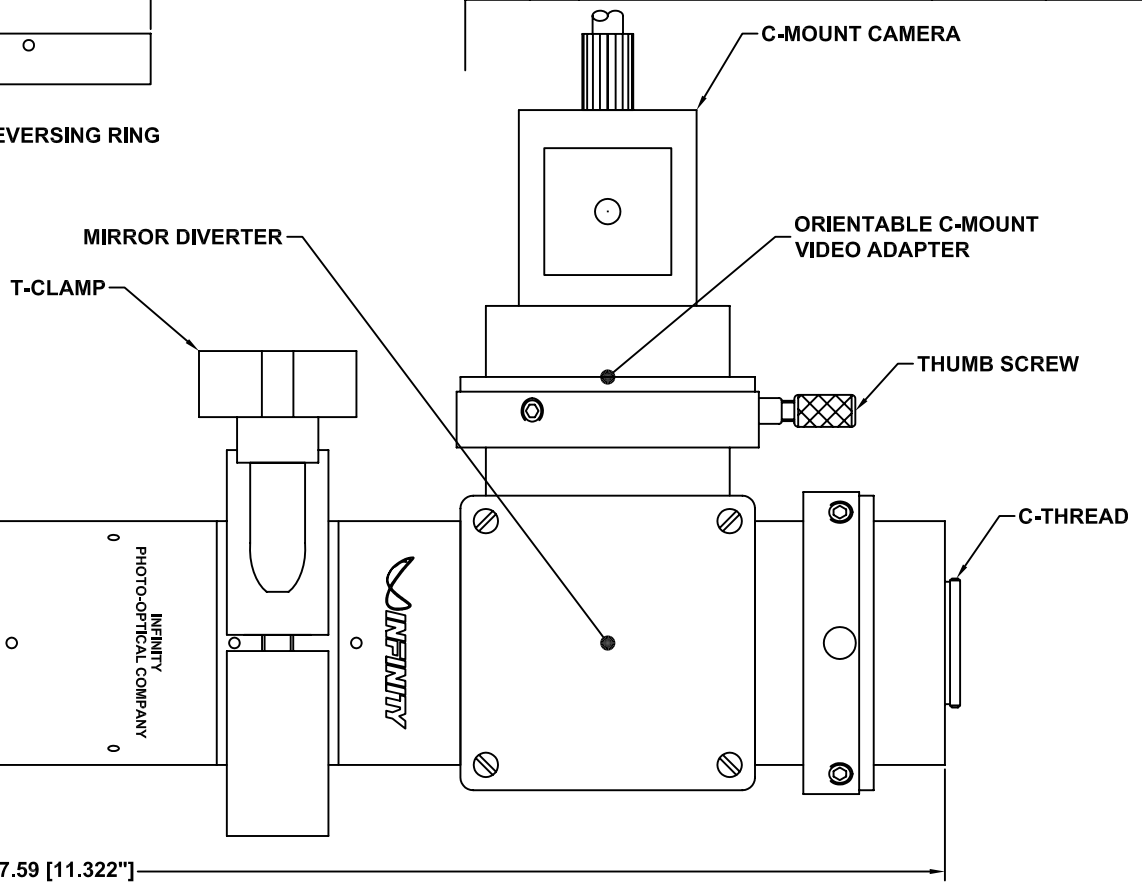
**INFINIVAR™ CFM-2/S WITH 50/50 BEAMSPLITTER**

Date: 02/08/05 MB	SIZE B	FSCM NO.	DWG NO. -	REV B
Modified: 08/11/06 MB	SCALE NONE	-	SHEET 1 OF 1	



FRONT REVERSING RING

REVISIONS				
ZONE	REV	DESCRIPTION	DATE	APPROVED



287.59 [11.322"]

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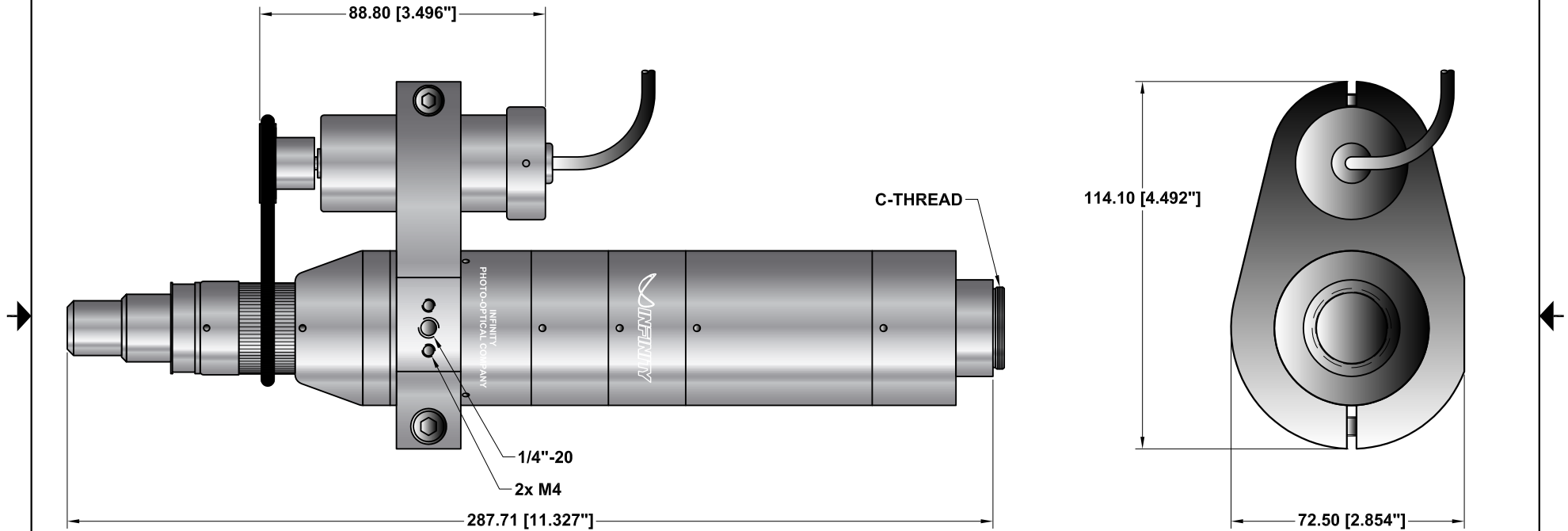
**INFINITY** Photo-Optical Company  
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**INFINIVAR™ CFM-2/S WITH MIRROR DIVERTER**

Date: 02/08/05 MB	SIZE B	FSCM NO.	DWG NO. -	REV A
Modified: 03/14/06 MB	SCALE NONE		SHEET 1 OF 1	

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ZONE	REV	DESCRIPTION	DATE	APPROVED



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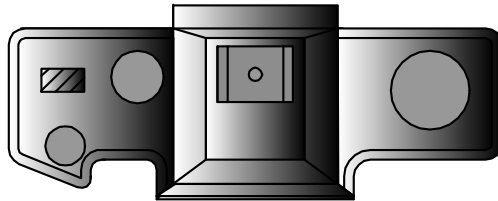
**INFINITY** Photo-Optical Company  
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**INFINIVAR™ CFM-2/S STANDARD  
CONFIGURATION-MOTORIZED**

Date: 07/16/04 MB	SIZE B	FSCM NO.	DWG NO. -	REV C
Modified: 01/19/05 MB	SCALE NONE	-	SHEET 1 OF 1	

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Photo or Large-Format Video  
SLR Body (or LF-Video) Camera



T2 mount 

Attach to InfiniVar for T-mount.

Video

2x DL Doubler 

C-mount 

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**Large Format Direct-Imaging Options**

Date: 11/20/97 MS	SIZE B	FSCM NO.	DWG NO.	REV -
Modified:	SCALE NONE	SHEET 1 OF 1		

## **INFINITY PHOTO-OPTICAL COMPANY LIMITED WARRANTY**

INFINITY PHOTO-OPTICAL COMPANY hereby warrants its products to be free from defects in workmanship or materials for the warranty period set forth below. INFINITY PHOTO-OPTICAL COMPANY, at its option, shall repair or replace the defective product without cost to the purchaser, and such repair or replacement shall be the full extent of this express limited warranty. INFINITY PHOTO-OPTICAL COMPANY shall not be liable for any other damages either direct or consequential.

This warranty is made to the original purchaser, and is effective only on new equipment purchased from INFINITY PHOTO-OPTICAL COMPANY, or a dealer authorized by INFINITY PHOTO-OPTICAL COMPANY to sell the product.

This warranty is valid only when the product is returned to the authorized dealer from whom it was purchased, or returned directly to INFINITY PHOTO-OPTICAL COMPANY, freight prepaid, with proof of date of purchase.

This warranty does not extend to any defect, malfunction or failure caused by misuse, abuse or the use of the product with equipment for which it may not have been intended. Any unauthorized repair voids this warranty.

The warranty period for all products manufactured by INFINITY PHOTO-OPTICAL COMPANY is five (5) years from date of original purchase. Parts or components made or sourced from other manufacturers shall be solely covered by that manufacturer's warranty.

The warranty contained herein is the only warranty made by INFINITY PHOTO-OPTICAL COMPANY. Any implied warranty of merchantability and/or fitness for a particular purpose is expressly excluded from this warranty. INFINITY PHOTO-OPTICAL COMPANY shall not be liable for any expense, loss, incidental or consequential damages which may arise in connection with the use of this equipment. Recovery under this warranty is limited to repair or replacement of the equipment as provided above.

INFINITY PHOTO-OPTICAL COMPANY reserves the right to modify designs, equipment and accessories without notice.