

**PROXIMITY SERIES:
InfiniTube™ Ultima
Microscope Tube Lens
Systems**

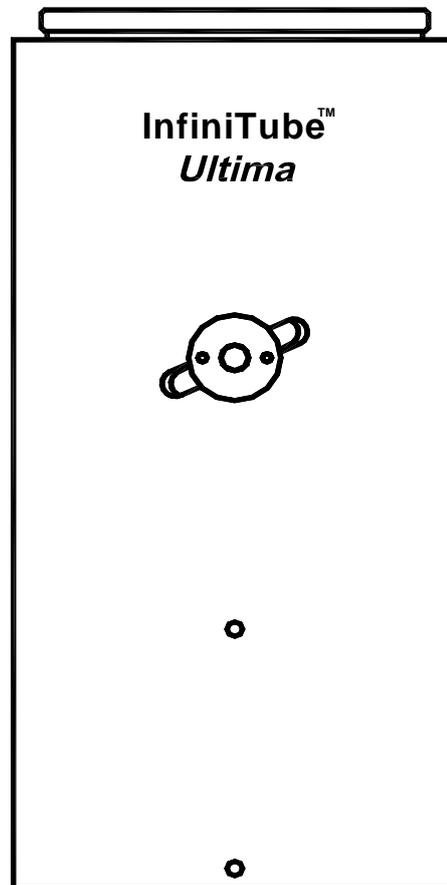


Photo-Optical Company • *Manufacturers of precision optical instruments.*

2530 Frontier Ave., Boulder, CO 80301 • Tel: (303) 440-4544 • Fax: (303) 440-4144 • E-mail: info@infinity-usa.com • Web: www.infinity-usa.com

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InfiniTube™ Ultima Microscope Tube Lens Systems

INSTRUCTIONS

- **Works with ALL Infinity-Corrected Objectives**
- **Color-matched for Zeiss, Leica, Nikon or Olympus—and others**
- **9 Elements in 5 groups (for Zeiss and Leica versions)**
- **8 Elements in 4 groups (for Nikon or Olympus—and others)**
- **Breadboard or Stand Options**

Thank you for purchasing an InfiniTube™ Ultima—the most advanced member of the InFiniTube Series. The Ultima will allow you to connect cameras and sensors to virtually every major brand of microscope objectives for unsurpassed application adaptability. It is designed to convey the image from infinity-corrected microscope objectives to the sensor, acting as the tube lens in binocular observation tubes. However, unlike simple tube lenses, the Ultima is highly corrected and maintains plan fields for even large formats.

The Main Body

The Ultima is a tubular device which belies the fact that it is composed of up to 9 elements in 5 groups. This makes it what we believe to be the world's most sophisticated patent-pending lens connector system for high-powered custom microscope applications. It is available in three versions: Standard for Nikon CF160, Olympus UIS/UIS2, Mitutoyo, Edmund and Achrovid objectives; Zeiss ICS correction; and, Leica HC-Delta correction. On each is a lever with counter-locking disc that allows a focus adjustment. On the bottom are threads to connect it to either a series of stand adapters for direct attachment to most major brands or, alternatively, to breadboard/custom attachments for specific applications you can construct to your own needs.

In order to keep all of the Ultima versions the same dimension and accept the same accessories, they all function for 160mm tube length equivalency. Therefore, it is possible to mount any of the Ultima units next to another made to function with objectives of different make on the same machined jig or support. Since Zeiss ICS objectives use 160mm as their tube length, the Z version consequently has a 1x factor. The S version—when used with 180mm tube length Olympus UIS/UIS2 and 200mm tube length Nikon CFI60 and 200mm tube length Mitutoyo-type objectives—provides 0.88x and 0.80x, respectively. Likewise, the L version for 200mm Leica HC/Delta also has a 0.80x factor. This means that the engraved magnifications on objectives is multiplied by these respective factors, permitting you to choose different Ultima modules in concert with different makes to obtain fields and magnifications determined by the very choice of objective. Keeping all mechanical dimensions the same substantially simplifies the system options and allows using all accessories between the Ultima types. Nevertheless, if your work requires a 1x factor, the Ultima can be supplied elongated for that tube length at slight additional cost.

Using the Ultima

The Ultima is connected by a series of adapter options to virtually every camera/sensor type used in microscopy. It can be supplemented by amplifiers for additional magnification such as the DL 2x and NTX 2x Tubes. The NTX 2x can be used with all formats up to full-frame 35mm (24 x 36mm; 43mm diagonal) sensors whereas, the DL 2x is strictly for C-mount formats. An M62 Eyepiece Holder permits standard microscope eyepieces (non-compensating only, since all corrections are already made in the Ultima itself) to be used on top, allowing typical microscope projection techniques to be employed so that (technically) the Ultima can fill even large 8-in. x 10-in. sheet film formats (purists be assured!).

Coaxial and Fluorescence Illumination Options

The Ultima modules have been designed to accept an attachable Coaxial Illuminator which accepts adapters for various filters. A Right Angle attachment allows fiber optic or LED guides to be mounted vertically. The Coaxial Illuminator operates in the infinity beam and does not affect the optical corrections. Upon request, we can quote installation of dichroic beam splitters filters for techniques of your specification.

Parfocal Function and Absolute Infinity Setting

Actually, calling the Ultima "parfocal" is inadequate. The Ultima can be set for an essentially perfect infinity beam. Two or more objectives can be set to be focused the same. To do this with revolver-mounted objectives, first:

- 1) Focus with a low-power objective (10x is recommended).
- 2) Swing to a high-power objective (such as 40x or 60x).
- 3) Focus mechanically with the high-power objective.
- 4) Swing back to the low-power objective and, **using the lock-ring lever adjustment**, re-establish focus for the low-power objective.
- 5) Swing back to the high-power objective and focus mechanically.
- 6) Finally, swing back to the low-power objective and touch up focus with the lock-ring lever adjustment. Turn to lock.

The two objectives will now be set so that the same Z-depth (stratum) in the sample/specimen will be in common focus—significantly better than the original parfocal setting made by the microscope manufacturers.

Touching-up Common Focus Between Modules

Many times, it is necessary to set two or more optics side-by-side on the same stand, jig or component—particularly in machine vision applications. The lock-ring lever adjustment can be used with low-power objectives to set a common focus—another advantage of the Ultima design.

All in the Drawings

Please refer to the attached drawings for suggested configurations. Infinity Photo-Optical or your Dealer will be happy to assist you with information on other possible component choices.

Care and Cleaning

The InfiniTube Ultima should be treated as the fine optical instrument it is. Care should be taken to keep dust and dirt off external surfaces. If the front element should ever need to be cleaned, use lens tissue moistened by a lens cleaner. NEVER USE SOLVENTS of any kind. The InfiniTube Ultima should NEVER be opened. If contaminants enter any inner parts, consult your dealer or INFINITY about cleaning services.

Warranty Service and Questions

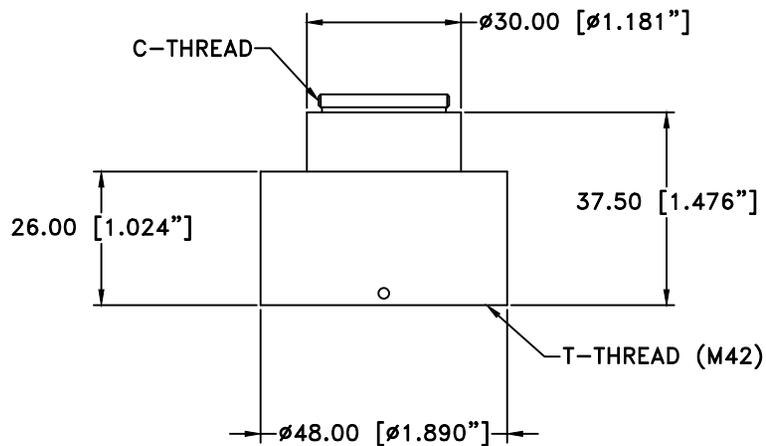
Specific details of the warranty are given on the limited warranty statement. In general, all parts and labor are guaranteed for one full year. Should the InfiniTube Ultima become damaged or need service, return it to your authorized dealer with a letter explaining the problem. If you have additional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

InfiniTube is a trademark of Infinity Photo-Optical Company.
U.S. Patent 7,869,139 may apply to this product. Additional patents pending.

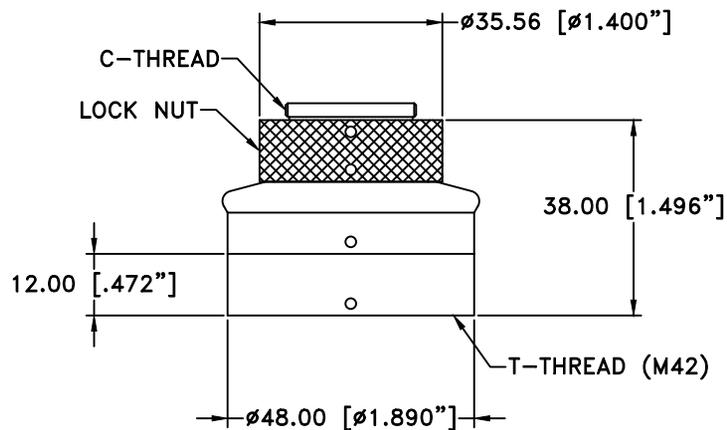
Video Formats

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

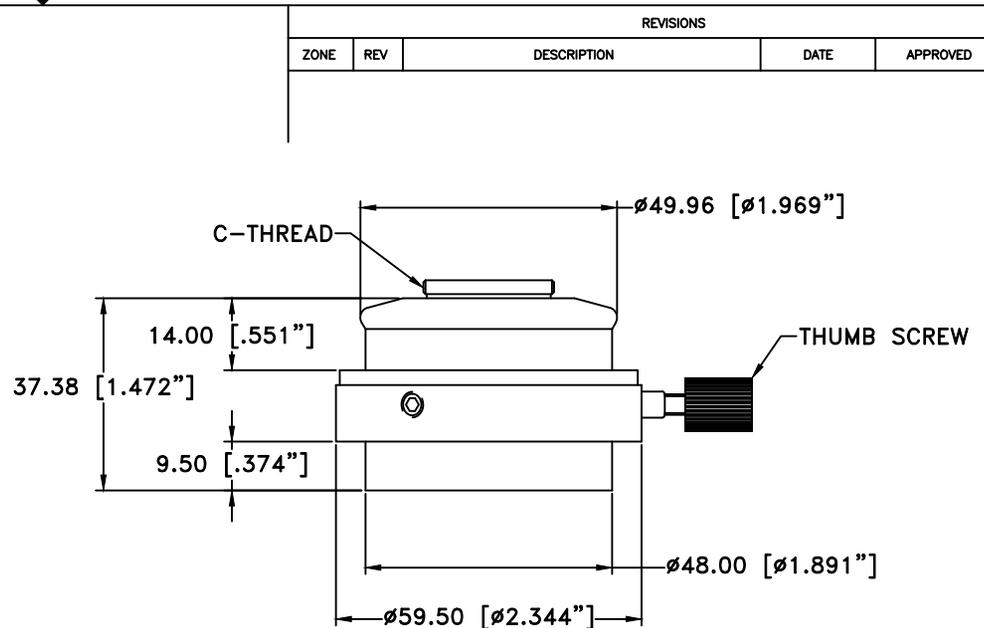
Unless otherwise noted all data is given for 1/2" camera sensors. For FOV or magnification in other sensor sizes use the factors listed. For example, a FOV of 25mm listed for a 1/3" camera would be $25 \times 0.75 = 18.75\text{mm}$.



770507
C-MOUNT VIDEO ADAPTER



770511
STANDARD ROTATABLE C-MOUNT



770509
ORIENTABLE C-MOUNT VIDEO ADAPTER

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REVISIONS				
ZONE	REV	DESCRIPTION	DATE	APPROVED

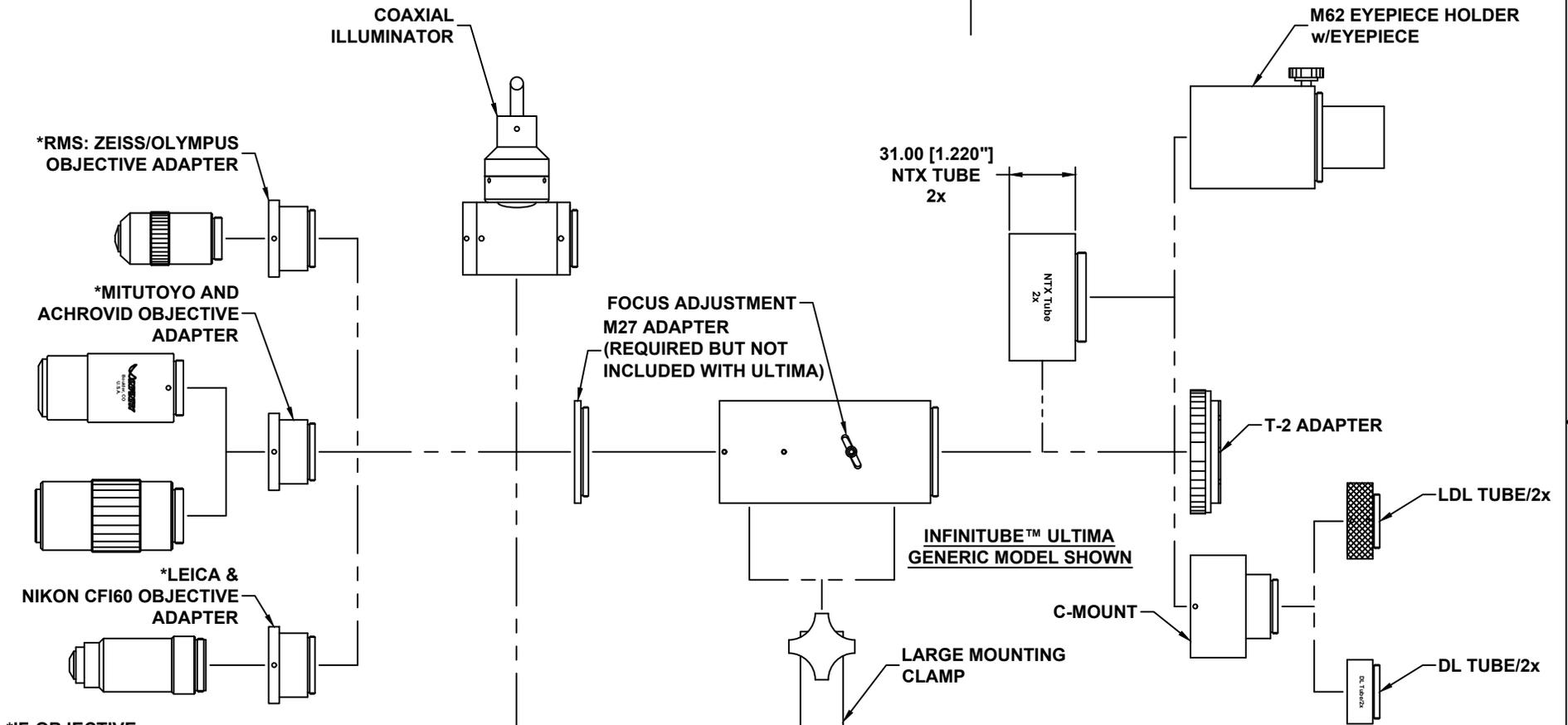
THIS DRAWING IS THE PROPERTY OF THE INFINITY PHOTO-OPTICAL COMPANY AND IT MUST BE TREATED AS CONFIDENTIAL.
SURFACE FINISH: OUTSIDE DIAMETERS FINISH IS CRITICAL. BEAD BLAST INTERNAL RETAINERS
ALL DIMS. ARE IN mm [INCH].
DIM'S. ARE AFTER ANODIZING
TOL. DIAMETERS: ±0.025 [±0.001"]
OTHERS: ±0.102 [±0.004"]
UNIFIED THREADS ARE CLASS 2
METRIC THREADS ARE MEDIUM FIT
BREAK ALL SHARP EDGES TO R0.25 [R0.010"]

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C-MOUNT VIDEO ADAPTERS

Date: 10/30/17 MB	SIZE B	FSCM NO.	DWG NO.	REV -
Modified:	SCALE NONE	-	SHEET 1 OF 1	-

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REVISIONS				
ZONE	REV	DESCRIPTION	DATE	APPROVED

NOTES:

- 1) GENERIC INFINITUBE™ ULTIMA SHOWN.
- 2) * MEANS THAT APPROPRIATE OBJECTIVE CAN ONLY BE USED WITH A PARTICULAR INFINITUBE™ ULTIMA e.g.: ZEISS OBJECTIVE WITH INFINITUBE™ ULTIMA ZEISS.

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

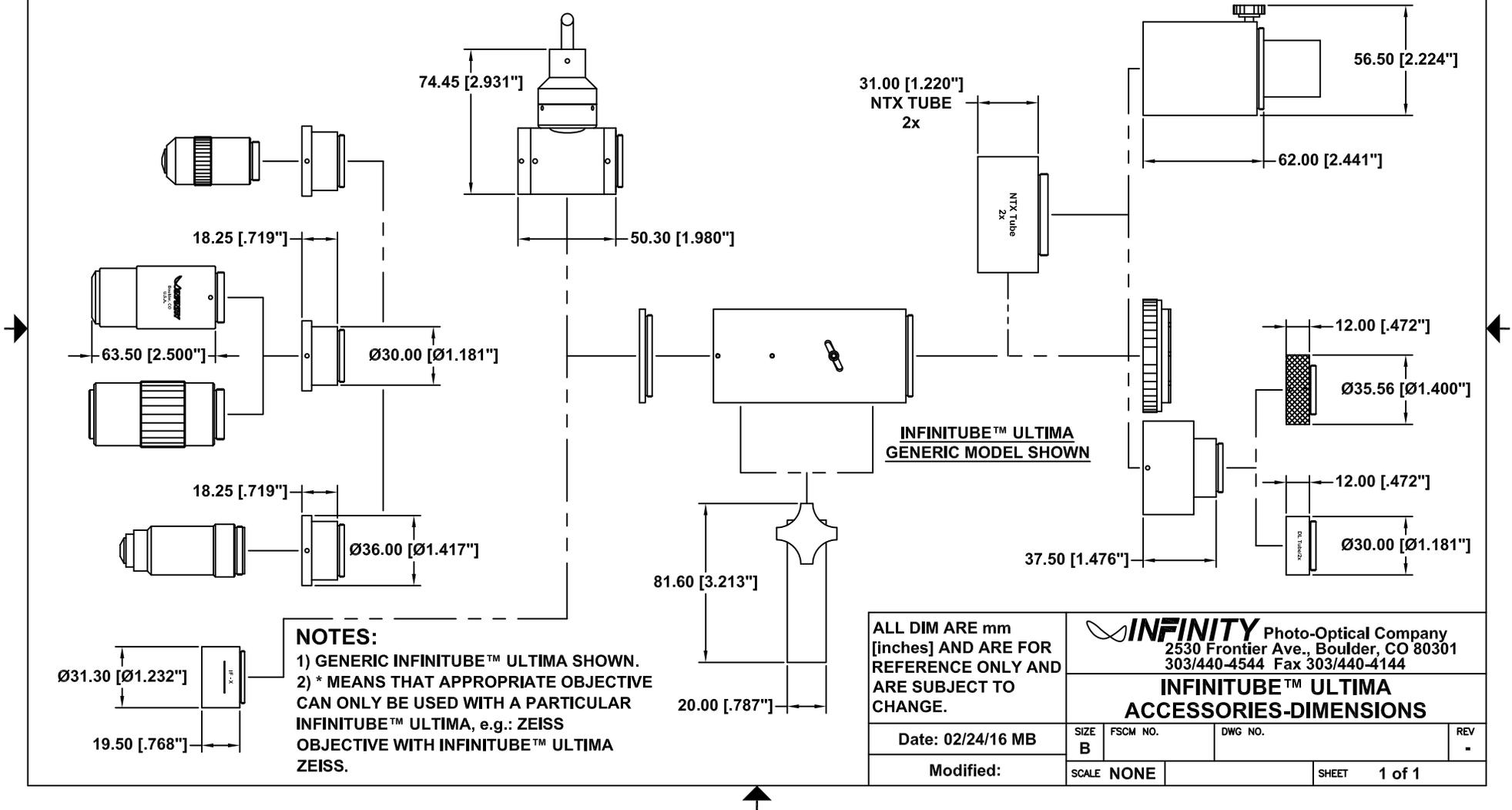
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INFINITUBE™ ULTIMA ACCESSORIES

Date: 02/24/16 MB	SIZE B	FSCM NO.	DWG NO.	REV -
Modified:	SCALE NONE	SHEET 1 of 1		

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REVISIONS				
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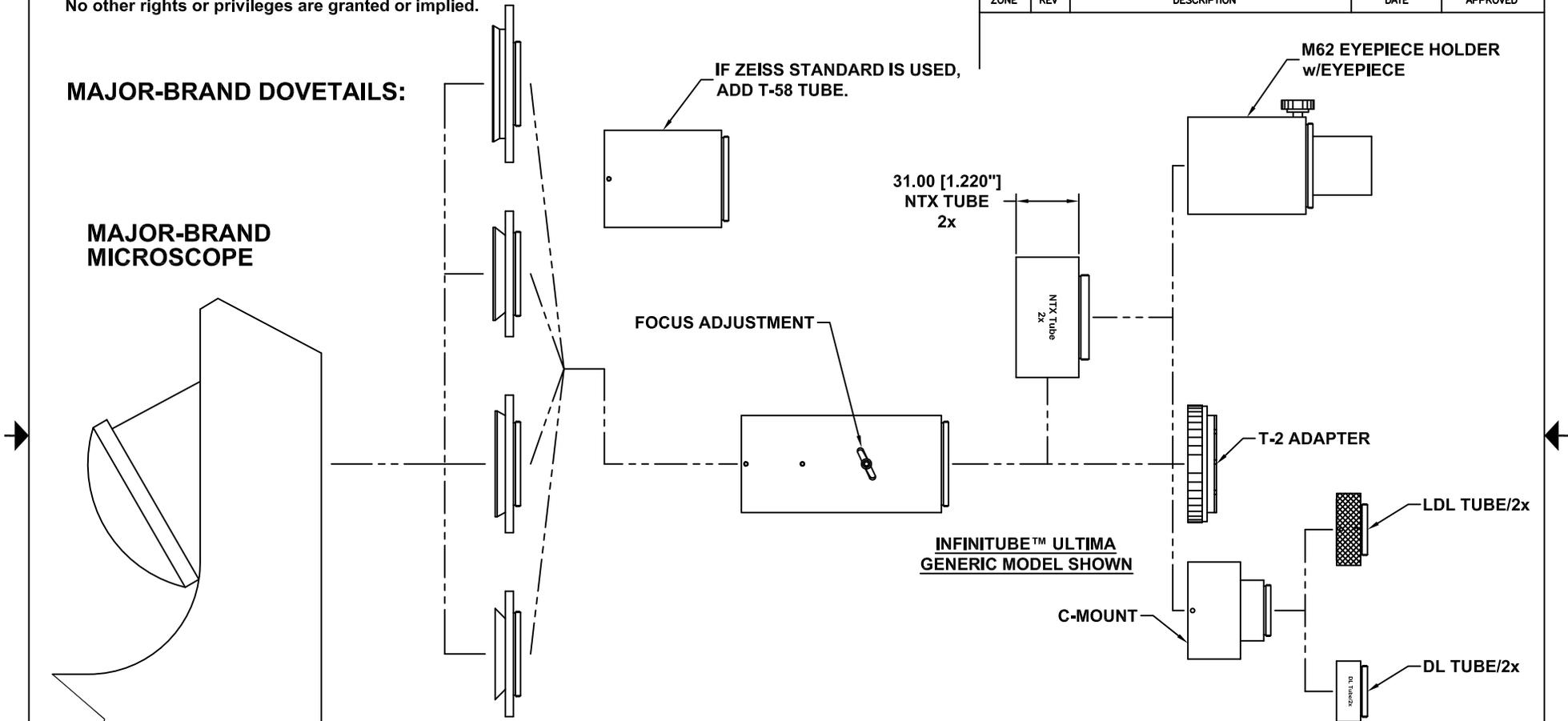
INFINITUBE™ ULTIMA ACCESSORIES-DIMENSIONS

Date: 02/24/16 MB	SIZE B	FSCM NO.	DWG NO.	REV -
Modified:	SCALE NONE	SHEET 1 of 1		

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MAJOR-BRAND DOVETAILS:

MAJOR-BRAND MICROSCOPE



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REVISIONS				
ZONE	REV	DESCRIPTION	DATE	APPROVED

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

INFINITUBE™ ULTIMA USED ATOP MICROSCOPE

Date: 02/24/16 MB	SIZE B	FSCM NO.	DWG NO.	REV -
Modified:	SCALE NONE	SHEET 1 of 1		

Video Formats

Format	Factor	Diagram
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1/3"	0.75	
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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.