

# OEM/Designer Handbook:

## InFocus™ Model KC Video Microscope



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

## InFocus™ Model KC Video Microscope

Model KC contains Infinity Photo-Optical's InFocus system. As such, it is capable of focus from infinity down to 56cm (22 in.). By screwing-on IF-Series objectives, the KC can function down to 62mm (2.44 in.). Finally, adapters are available for use with infinity-corrected objectives (RMS-standard or Mitutoyo). This means that the KC's ultimate focus range, magnification and resolution are limited *only* by the availability of microscope objectives suitable for use. Because the KC is color-corrected itself, we recommend objectives which are also self-corrected (so-called "color-free" or "color-contained" objectives).

The KC is primarily a video-dedicated instrument. For visual and photo requirements, our larger Industrial InFocus is recommended, although it is possible to use the KC for such purposes. With the addition of suitable accessories, the KC can be equipped for virtually all video formats. Please refer to the attached drawings for further details.

The KC is composed of a Main Body which contains its InFocus focusing system, activated by rotation of the focusing ring. A Clamp is provided (more can be obtained as accessories) to allow positioning and mounting capabilities. The Front has threads (M27) for attaching various objectives and adapters; the rear of the Main Body has C-mount threads for video camera attachment.

**Reference Setting.** You will notice that there is a reference dot that can be positioned to oppose the focusing ring's lock-screw (bright metal). This is irrelevant for use directly or with IF-Series objectives. However, when infinity-corrected microscope objectives are used with their appropriate adapters, the KC should be calibrated for infinity focus and that point should be the setting used to initially focus (up and down) microscope objectives. To calibrate the KC, first focus on a far distant object (at infinity); use a piece of vinyl tape at the front end of the focusing ring to hold that position. Next, use the 2-56 Allen wrench provided with the microscope objective adapter to unlock the three black screws on the focusing ring lock, then turn the ring so that the bright metal lock-screw opposes the mark on the focusing ring. (Gently) lock the black screws and remove the vinyl tape. Your KC is now referenced for initial focus with microscope objectives. From the up and down position then found, it will be possible to focus without any additional movement as a result of the KC's InFocus system.

**Variable Iris Diaphragm.** The Variable Iris Diaphragm replaces the C12 spacer tube supplied as standard equipment. Use the 2-56 Allen wrench supplied with the Iris to loosen the setscrews on the C12 and on the C96 tube above it. The Iris can be interfaced and set-locked.

**Filter Holder.** The Regular Filter Holder is used either at the front of the KC (direct), between IF-Series objectives and the KC Main Body—or interfaced between KC Main Body and Microscope Objective Adapter. 25mm diameter filters can be placed inside and secured by the retaining ring. When using IF-Series objectives, especially on machines, jigs, etc., you may wish to reference the infinity point (see above) when the Regular Filter Holder is in place. This will allow multiple units to have the same settings.

**DL Doubler Tube.** The DL Doubler Tube provides a 2x factor. The DL Tube interfaces the KC and the video camera and maintains all focus ranges, etc.—but at a 2x increase in magnification.

**Tele-Tube/C.** The Tele-Tube/C compacts the KC and approximately halves the magnification. This unit replaces the standard C96 tube or AVS-2 Optical Drawtube (see below). Tele-Tube/C maintains parfocality and does not alter the usable ranges of the KC. Tele-Tube/C is recommended when sensor sizes go below the ½-inch format, whenever a wider field of view is desired, etc. Tele-Tube/C can be used with infinity-corrected objectives, but some vignetting can be expected, since most objectives are corrected for use with the KC's standard tubelength and system magnification.

**Coaxial Illuminator.** The Coaxial Illuminator provides illumination (the objective itself acts as a condenser) and attaches to the KC by means of a rotatable adapter. Separating the adapter yields a recess for 25mm diameter filters. By adjusting the rotation, the infinity range scale can be oriented to face the user. Because the Vertical Illuminator contains a precise collector lens system, it can be used with IF-4 and greater objectives, as well as infinity-corrected objectives of other makes—to 100x intrinsic objective magnification. As generally configured, the Coaxial Illuminator is equipped with a variable iris diaphragm. A spacer tube can be exchanged for an Illuminator Filter Holder. In this way, a polarizing filter can be added to the originating light and another polarizing filter can be put in the top 25mm diameter recess.

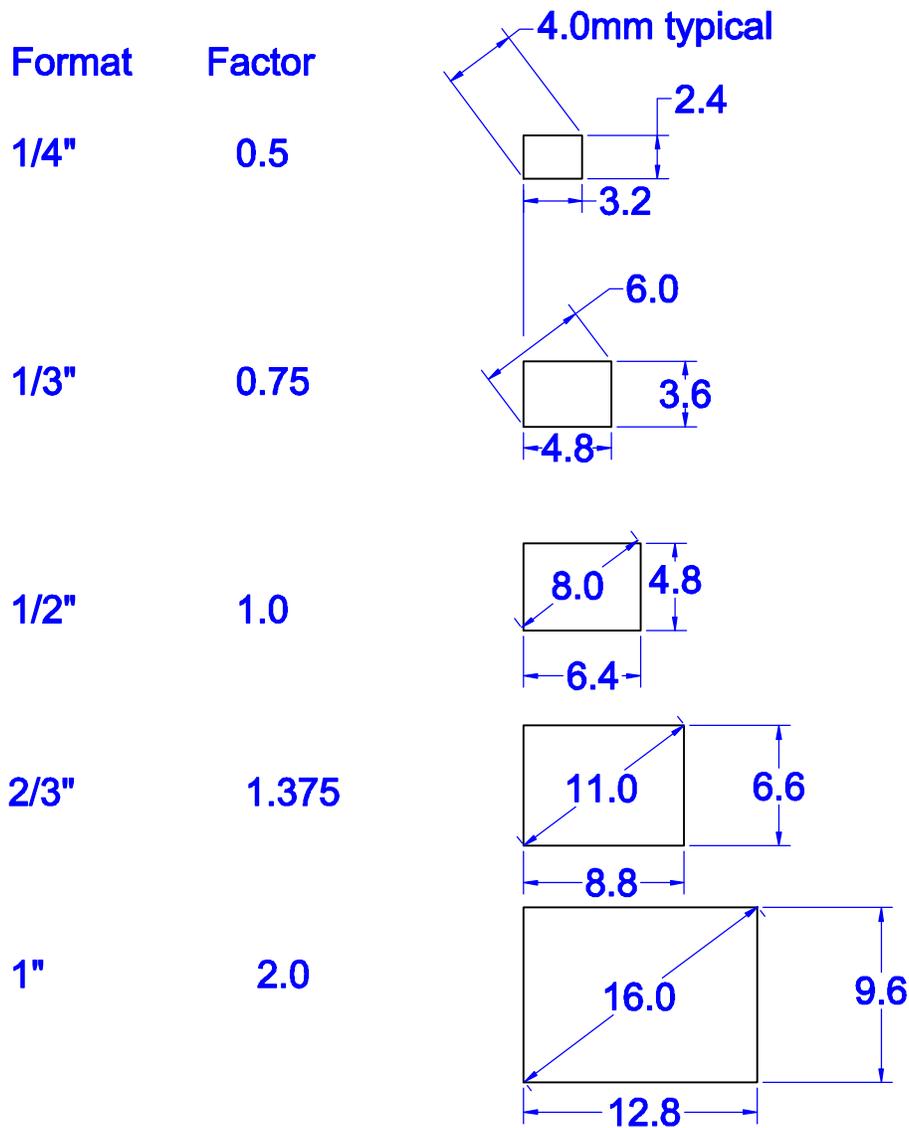
If requirements are limited to objectives of no greater magnification than 10x and N.A. of 0.30, a simpler version of the Coxial Illuminator can be supplied without the sophisticated collector system or without the variable iris diaphragm. In all other respects, the simplified versions couple to the KC in the same way as the standard configuration.

**Large Format Capabilities.** The KC will provide direct field coverage with video cameras up to the 2/3-inch format. As a true microscope, the KC must have its field amplified for direct objective use with larger formats. Microscopes have traditionally used either the eyepiece in-system or a negative amplifier to accomplish this. Two reasons prevailed: First, until plan objectives were developed, only the central area of the microscope objective's field could be utilized. Secondly, most microscope objectives required an eyepiece to be used to "compensate" for color errors in the objective. Thus magnification and color-correction were imparted by the eyepiece or amplifier in order to meet these conditions. With the relatively recent development of color-contained and infinity-corrected objectives—particularly of the plan type—it became possible to use objectives direct-to-sensor. Since video formats have generally been smaller than eyepiece fields, it was possible to design the KC for direct objective use with 2/3-inch cameras. Beyond the 2/3-inch format, the KC requires conventional amplification. To accommodate large format video sensors, the KC can be equipped with our Step-up Adapter and negative-amplifying PD Tube, (1.8x factor with KC). For the largest video formats and 35mm photomicrography, the KC can be equipped with our Unipar adapters. The Unipar adapters are always used in conjunction with a positive eyepiece and multiply the eyepiece's magnification by 0.2x and 0.3x factors. Please see the attached drawings for details.

If direct objective use is required with large format cameras *without* further field extension as described above, our Industrial InFocus system should be used. Its larger-diametered internal optics are designed to permit such use. On the other hand, the KC was designed to be as compact as possible—and still be able to be accessorized for use with all formats beyond 2/3-inch size.

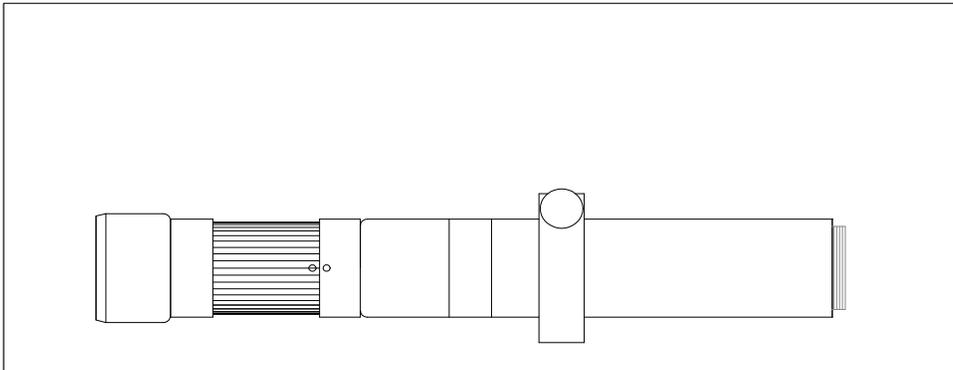
**Care and Cleaning.** The KC is a self-contained optical pod and requires no internal adjustments, etc. The unit can be cleaned (metal parts only) by a cloth moistened with alcohol. The external optical surfaces should be cleaned only when necessary, and then, only by a soft cotton swab moistened by an approved optical glass cleaner. If you have further questions, please contact Infinity Photo-Optical Company or your authorized dealer.

# Video Formats



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  $25 \times 0.75 = 18.75\text{mm}$ .

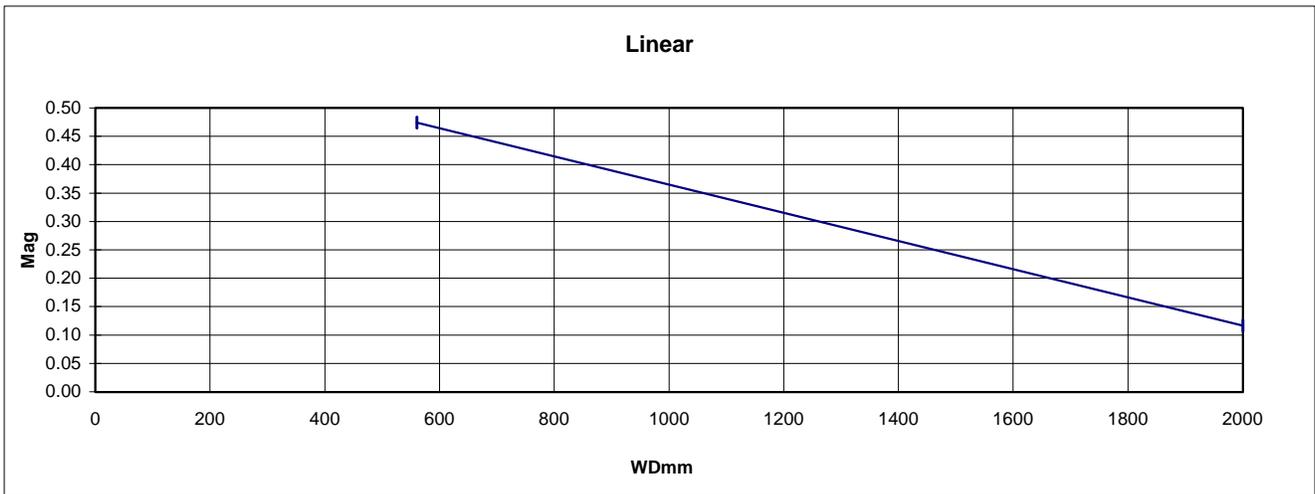
**KC OPTICAL DATA: TOTAL DIRECT RANGE IN STANDARD CONFIGURATION**



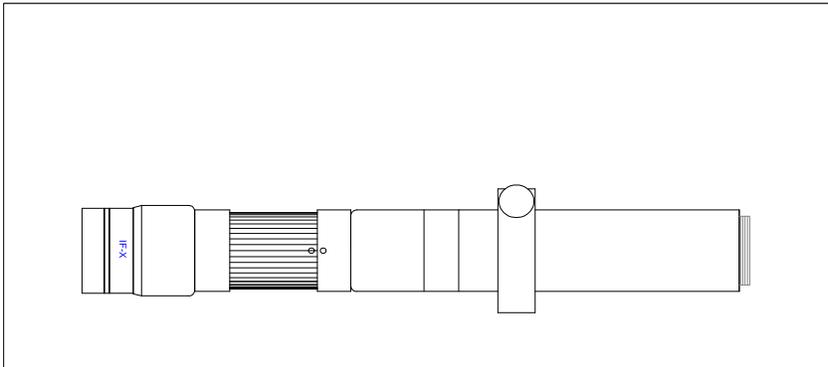
This configuration is for data below. See technical drawings for mechanical dimensions and mounting. The instrument will focus from 560mm to infinity.

	Direct	
	Near	2m
<b>WD mm</b>	560	2000
<b>MAG</b>	0.47	0.12
<b>FOV* mm</b>	13.5	55

\*FOV based on 1/2" video format (6.4mm horizontally). See Video Format Page.



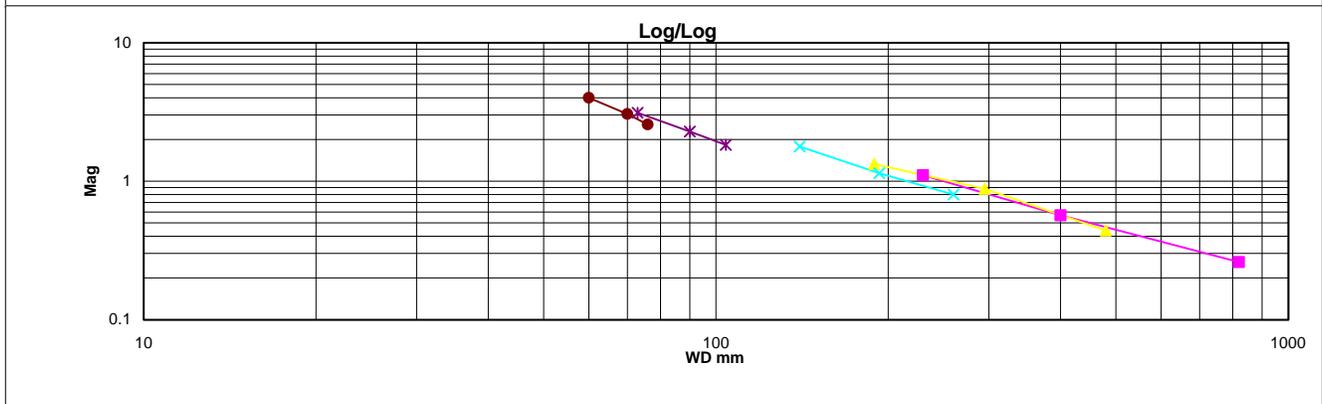
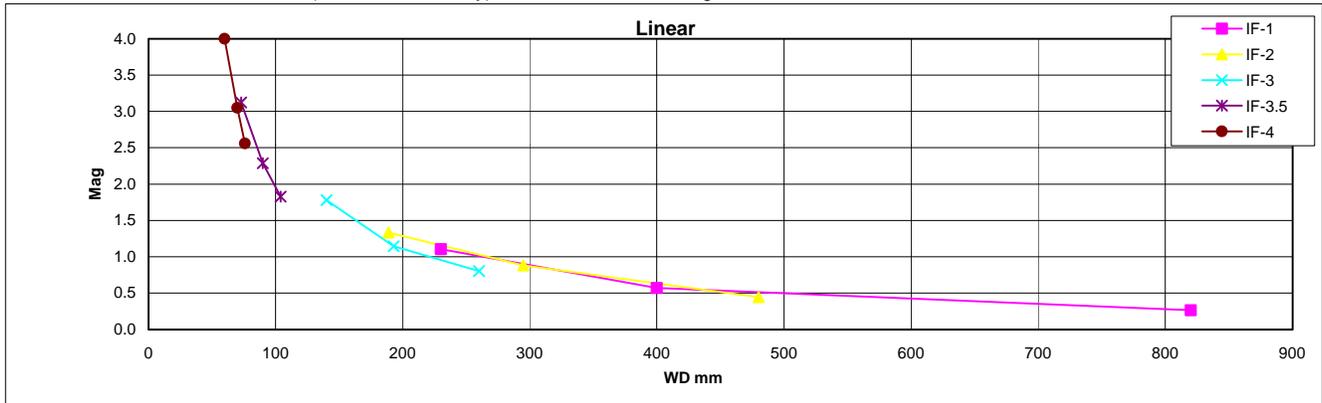
**KC OPTICAL DATA: TOTAL RANGE IN STANDARD CONFIGURATION WITH IF-SERIES OBJECTIVES**



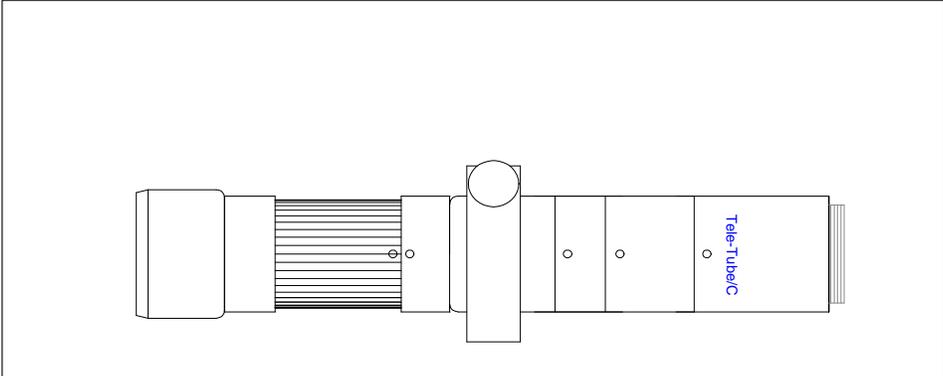
This configuration is for data below. See technical drawings for mechanical dimensions and mounting. (Set first to infinity position in order to reference initial working distance).

	IF-1			IF-2			IF-3			IF-3.5			IF-4		
	Near	Inf	Far	Near	Inf	Far	Near	Inf	Far	Near	Inf	Far	Near	Inf	Far
<b>WD mm</b>	230	400	820	189	295	480	140	193	260	73	90	104	60	70	76
<b>MAG</b>	1.1	0.6	0.3	1.3	0.9	0.4	1.8	1.1	0.8	3.1	2.3	1.8	4.0	3.0	2.6
<b>FOV* mm</b>	5.8	11.25	24.5	4.8	7.25	14.5	3.6	5.6	8	2.05	2.8	3.5	1.6	2.1	2.5

\*FOV based on 1/2" video format (6.4mm horizontally). See Video Format Page.



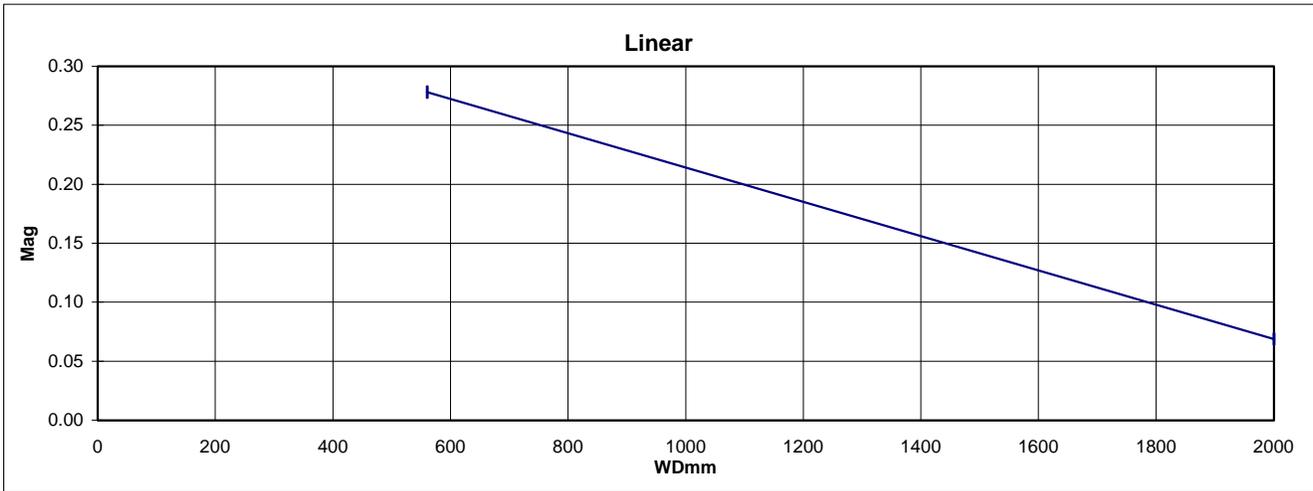
**KC OPTICAL DATA: TOTAL DIRECT RANGE WITH TELE-TUBE/C**



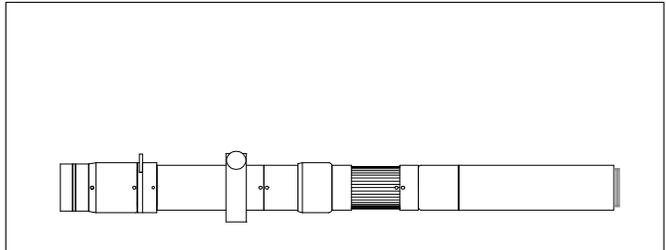
**This configuration is for data below. See technical drawings for mechanical dimensions and mounting. The instrument will focus from infinity down to 560mm.**

	Direct	
	Near	2m
<b>WD mm</b>	560	2000
<b>MAG</b>	0.28	0.07
<b>FOV* mm</b>	23	93

\*FOV based on 1/2" video format (6.4mm horizontally). See Video Format Page.



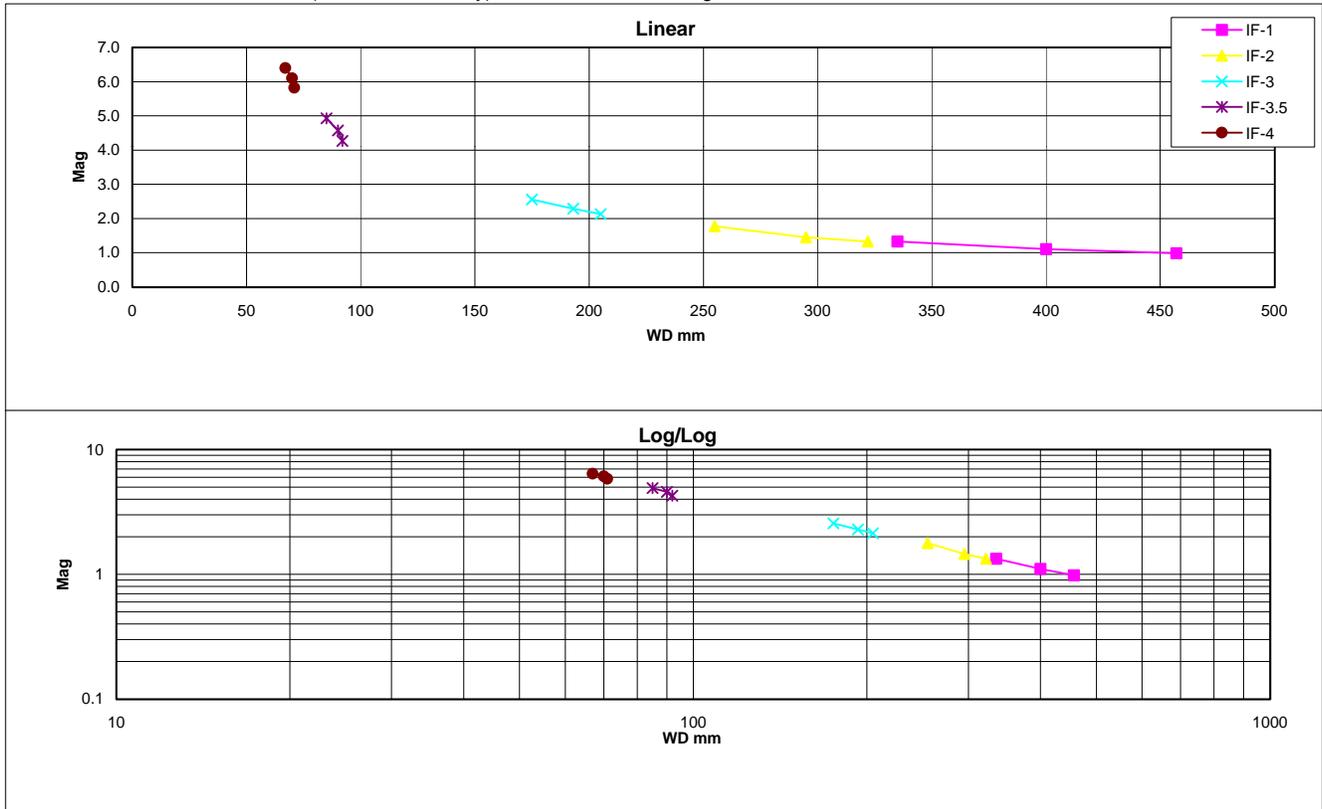
**KC OPTICAL DATA: TOTAL RANGE WITH CENTRIC TUBE (WITH OR WITHOUT COAXIAL ILLMINATOR)**



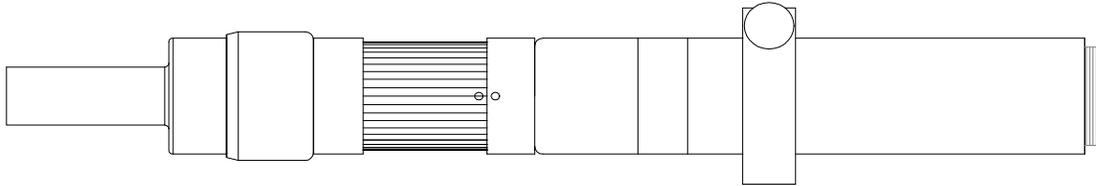
This configuration is for data below. See technical drawings for mechanical dimensions and mounting. (Set first to infinity position in order to reference initial working distance).

	IF-1			IF-2			IF-3			IF-3.5			IF-4		
	Near	Inf	Far	Near	Inf	Far	Near	Inf	Far	Near	Inf	Far	Near	Inf	Far
<b>WD mm</b>	335	400	457	255	295	322	175	193	205	85	90	92	67	70	71
<b>MAG</b>	1.3	1.1	1.0	1.8	1.5	1.3	2.6	2.3	2.1	4.9	4.6	4.3	6.4	6.1	5.8
<b>FOV* mm</b>	4.8	5.8	6.5	3.6	4.4	4.8	2.5	2.8	3	1.3	1.4	1.5	1	1.05	1.1

\*FOV based on 1/2" video format (6.4mm horizontally). See Video Format Page.



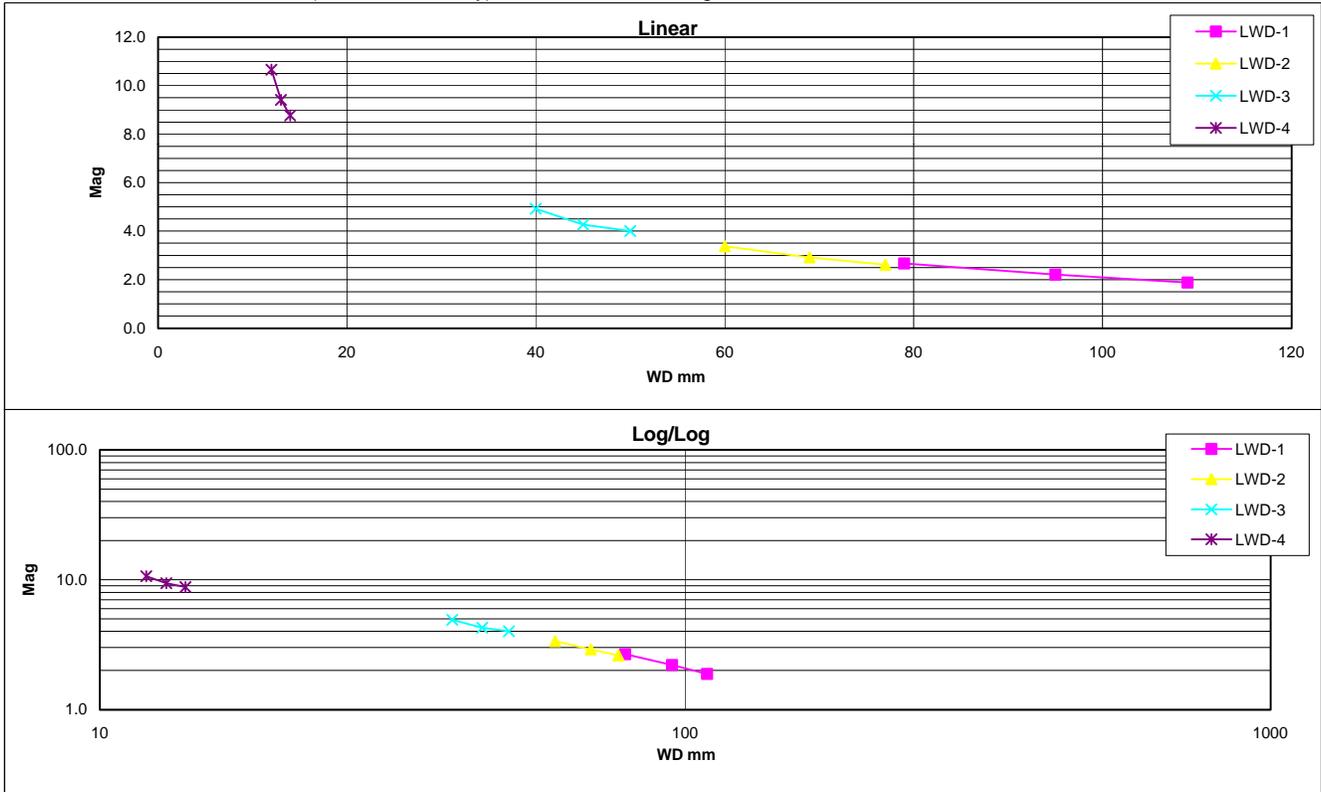
**KC OPTICAL DATA: TOTAL RANGE IN STANDARD CONFIGURATION WITH LWD OBJECTIVES**

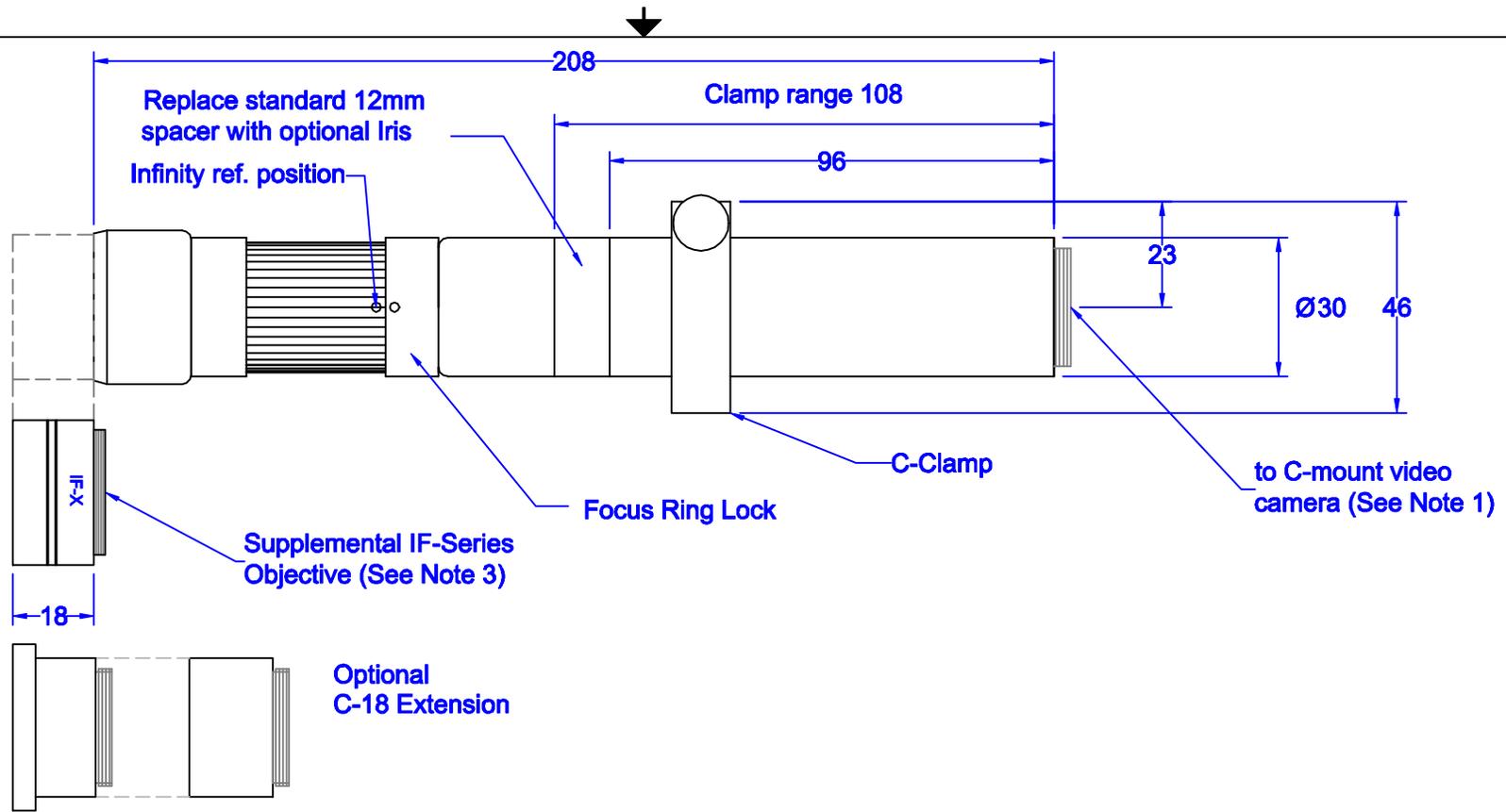


This configuration is for data below. See technical drawings for mechanical dimensions and mounting. (Set first to infinity position in order to reference initial working distance).

	LWD-1			LWD-2			LWD-3			LWD-4		
	Near	Inf	Far	Near	Inf	Far	Near	Inf	Far	Near	Inf	Far
<b>WD mm</b>	79	95	109	60	69	77	40	45	50	12	13	14
<b>MAG</b>	2.7	2.2	1.9	3.4	2.9	2.6	4.9	4.3	4.0	10.7	9.4	8.8
<b>FOV* mm</b>	2.4	2.9	3.4	1.9	2.2	2.45	1.3	1.5	1.6	0.6	0.68	0.73

\*FOV based on 1/2" video format (6.4mm horizontally). See Video Format Page.

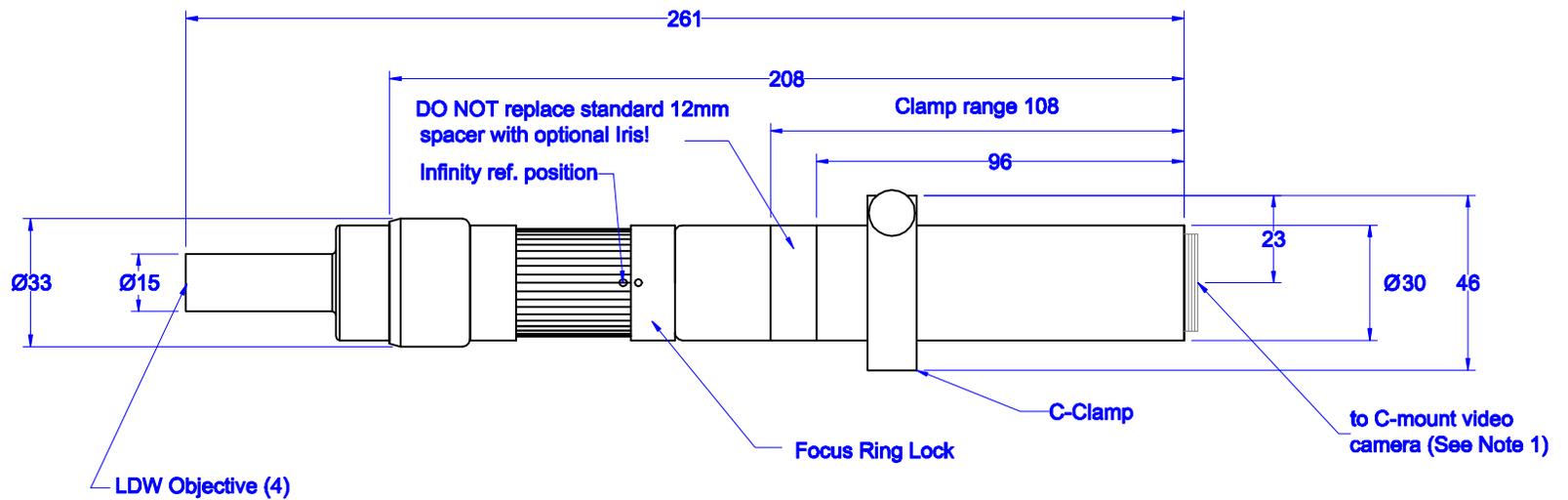




**Notes:**

1. Use with C-mount video cameras.
2. For video cameras that use T2 Adapter mount (e.g., Nikon "F"-mount) see KC System for Large Format Video and KC System with Stereo Stand Adapter drawings.
3. IF-Series Objectives can be added to standard KC for increased magnification (see KC Optical Data Chart).

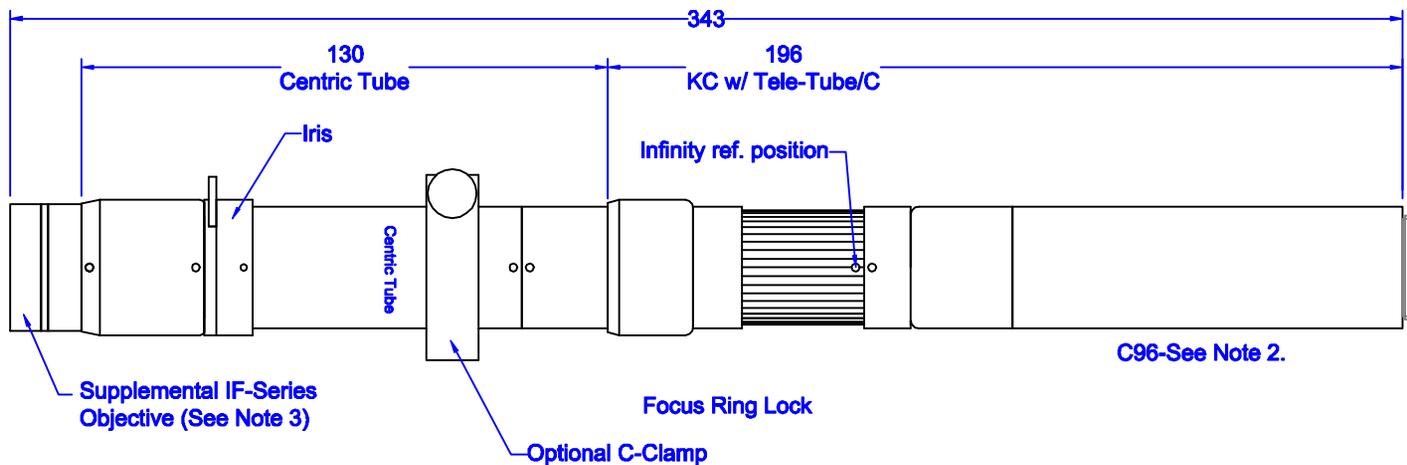
ALL DIM ARE mm [inches] AND ARE FOR REFERENCE ONLY AND ARE SUBJECT TO CHANGE.		<b>INFINITY</b> Photo-Optical Company 2530 Frontier Ave., Boulder, CO 80301 303/440-4544 Fax 303/440-4144	
<b>KC System</b>			
Date: 12/19/96	SIZE <b>B</b>	FSCM NO.	DWG NO.
Modified: 7/29/97	SCALE <b>NONE</b>	<b>KC</b>	SHEET <b>1 OF 1</b>



**Notes:**

1. Use with C-mount video cameras.

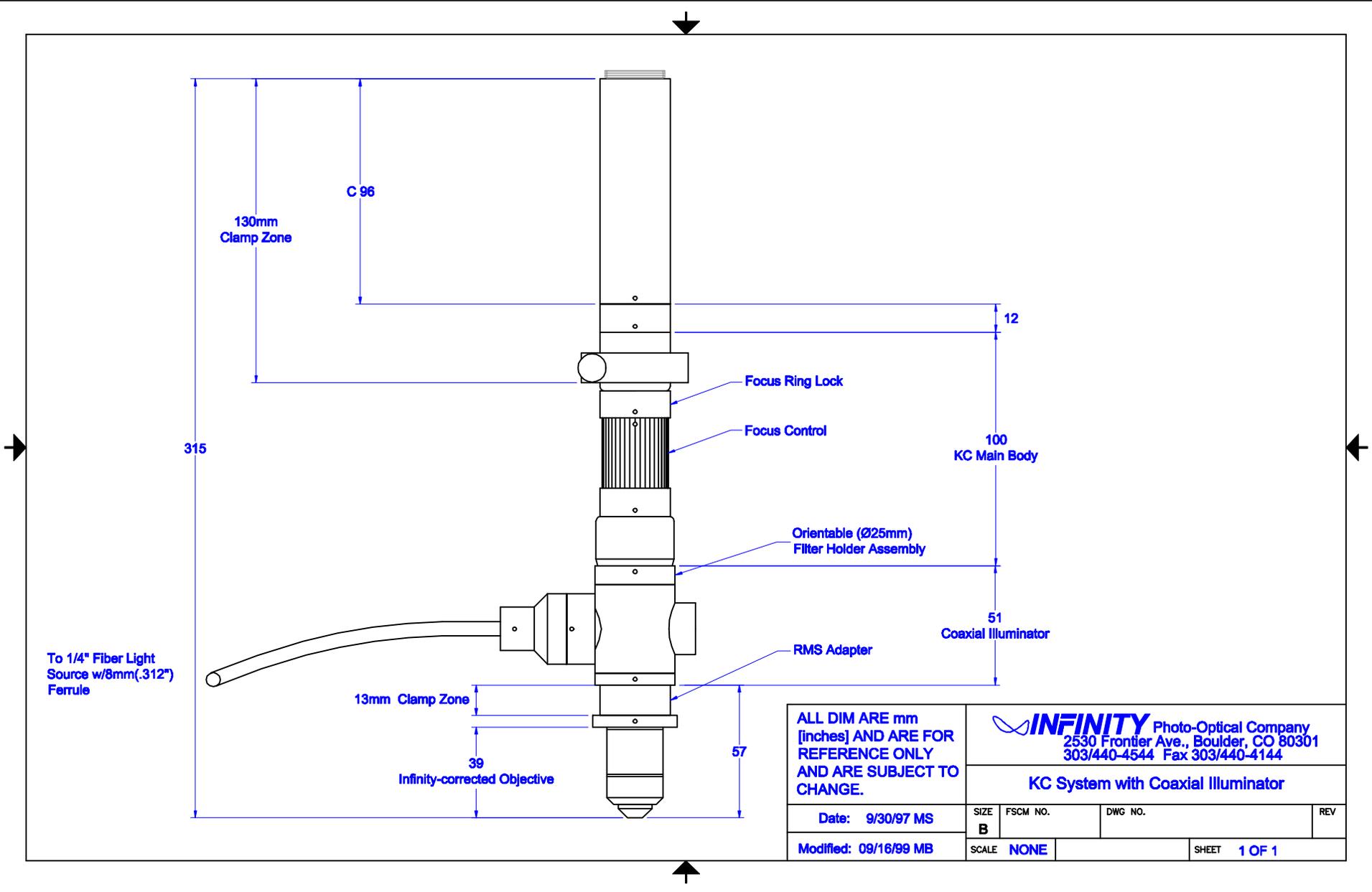
ALL DIM ARE mm [inches] AND ARE FOR REFERENCE ONLY AND ARE SUBJECT TO CHANGE.		 <b>INFINITY</b> Photo-Optical Company 2530 Frontier Ave., Boulder, CO 80301 303/440-4544 Fax 303/440-4144	
<b>KC System with LWD Objectives</b>			
Date: 4/6/1999	SIZE <b>B</b>	FSCM NO.	DWG NO.
Modified: 9/20/1999	SCALE	<b>NONE KC</b>	SHEET <b>1 OF 1</b>



**Notes:**

1. Use with C-mount video cameras.
2. Remove 12mm or Iris Diaphragm tube from standard KC. Use KC DIRECT with C96 spacer. Interface Centric Tube between KC and IF-Series objectives.
3. IF-Series Objectives can be used for various ranges (see KC Telecentric Mode Chart).

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		<b>KC Multi-Telecentric System</b>		
<b>Date:</b> 4/23/1998	SIZE <b>B</b>	FSCM NO.	DWG NO.	REV
<b>Modified:</b>	SCALE <b>NONE</b>	SHEET <b>1 OF 1</b>		



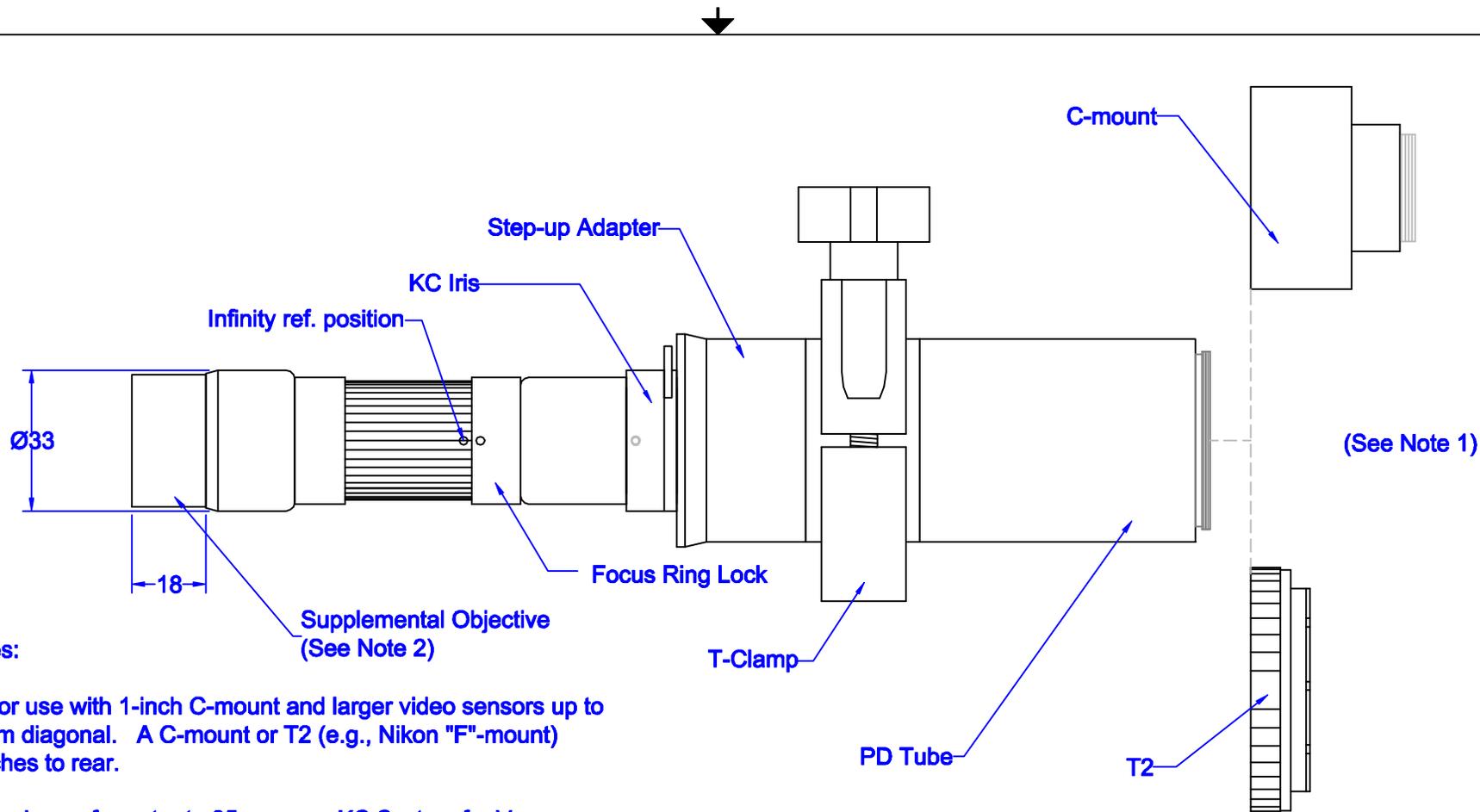
To 1/4" Fiber Light Source w/8mm(.312") Ferrule

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**KC System with Coaxial Illuminator**

Date: 9/30/97 MS	SIZE	FSCM NO.	DWG NO.	REV
Modified: 09/16/99 MB	B			
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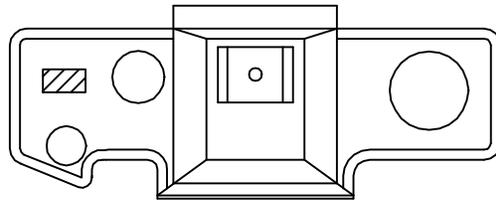


**Notes:**

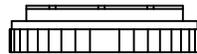
1. For use with 1-inch C-mount and larger video sensors up to 25mm diagonal. A C-mount or T2 (e.g., Nikon "F"-mount) attaches to rear.
2. For larger formats--to 35mm--see KC System for Very Large Format Video drawing.
3. IF-Series Objectives can be added to standard KC for increased magnification (see KC Optical Data Chart).
4. The PD factor is 1.8x.

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Date: 12/19/96		<b>KC System for Large Format Video</b>	
SIZE B	FSCM NO.	DWG NO.	REV
Modified: 8/27/97	SCALE NONE	KC	SHEET 1 OF 1

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



T2 mount

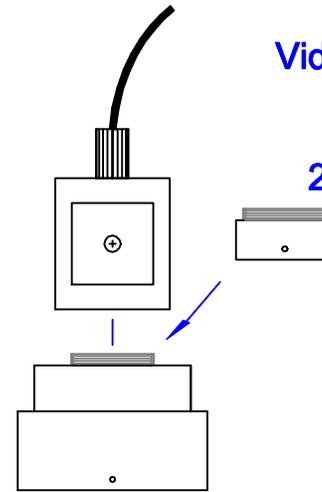


Attach to Model KC  
 w/Step-up Adapter Set

Video

2x DL Doubler

C-mount



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 [inches] AND ARE FOR  
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 AND ARE SUBJECT TO  
 CHANGE.

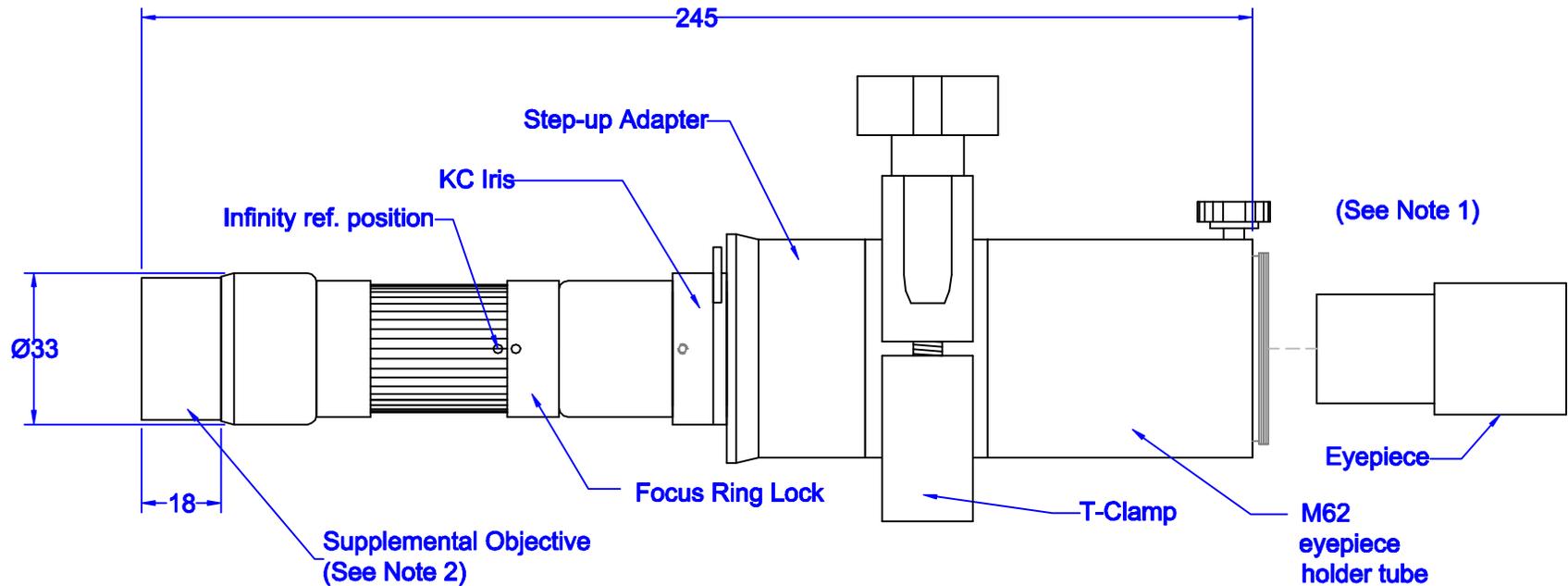
Date: 8/26/97

Modified: 11/20/97

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Large Format Direct-Imaging Options for KC

SIZE B	FSCM NO.	DWG NO.	REV
SCALE NONE	SHEET 1 OF		



**Notes:**

1. Use with very large format video cameras and sensors up to 35mm format. Please refer to the Photo/Video Micrographic Options drawing showing UNIPAR adapters.
2. IF-Series Objectives can be added to standard KC for increased magnification (see KC Optical Data Chart).
3. UNIPAR is available in factor of 0.3x for very large formats. Eyepiece rated power times UNIPAR factor equals on-sensor magnification.

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	<b>KC System for Very Large Format Video</b>			
Date: 12/19/96	SIZE <b>B</b>	FSCM NO.	DWG NO.	REV
Modified: 8/27/97	SCALE	<b>NONE</b>	<b>KC</b>	SHEET <b>1 OF 1</b>

Photo/Large-Format Video

SLR Body (or LF-Video) Camera

Video

T2 mount

C-mount

2x DL Doubler

2x DL Doubler

Unipar-Vid 0.2x video adapter

Unipar 0.3x video/photo adapter

or

T30 spacer

Eyepiece

M62 monocular

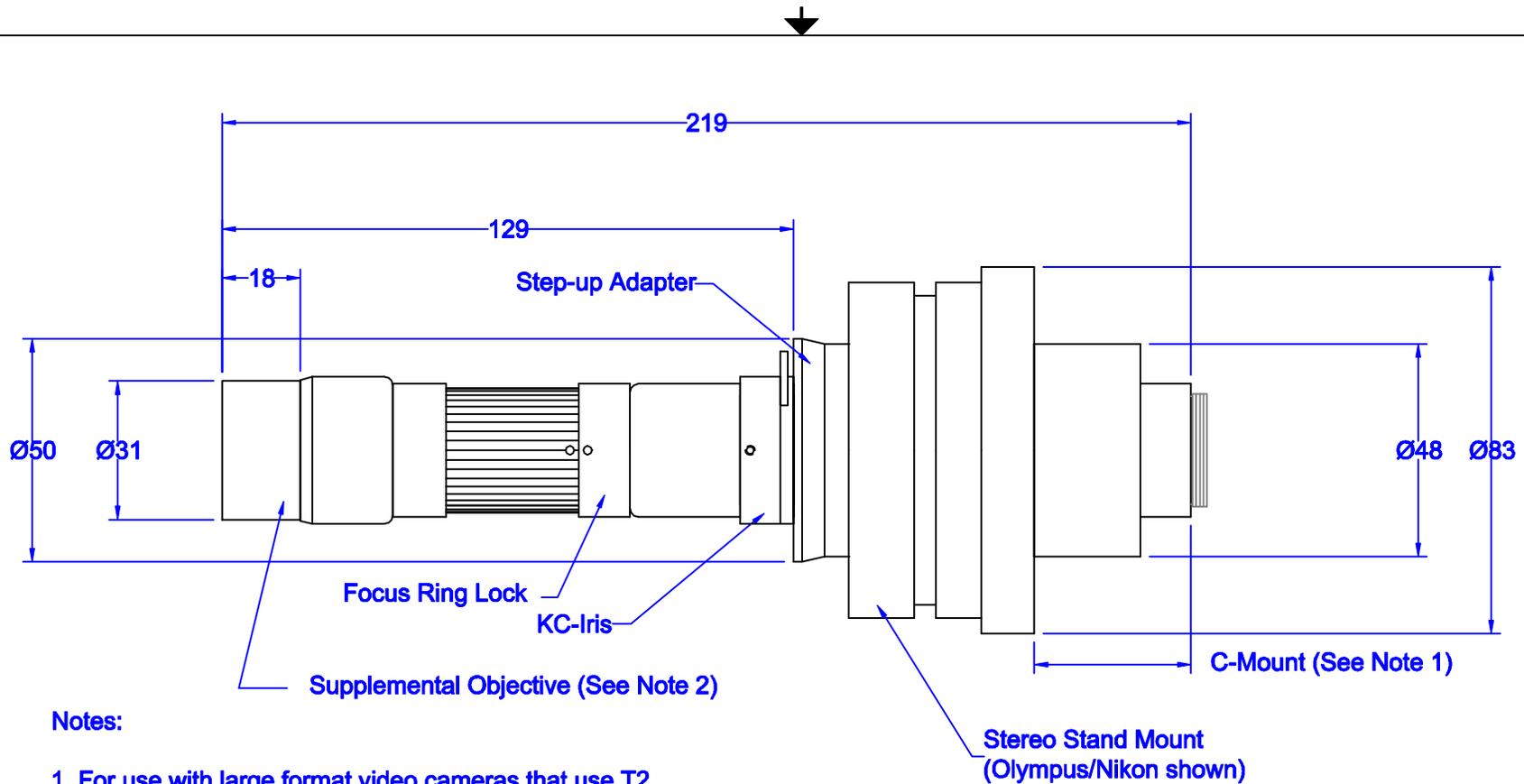
to Instrument

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**Photo/Video Micrographic Options**

	SIZE B	FSCM NO.	DWG NO.	REV
8/28/97	SCALE NONE	SHEET 1 OF 1		



**Notes:**

1. For use with large format video cameras that use T2 Adapter (e.g., Nikon "F"-mount), the C-mount can be replaced by any T2 Adapter at this position. A PD tube or Unipar Should be used.

2. IF-Series Objectives can be added to standard KC for increased magnification (see KC Optical Data Chart).

ALL DIM ARE mm [Inches] AND ARE FOR REFERENCE ONLY AND ARE SUBJECT TO CHANGE.		 <b>INFINITY</b> Photo-Optical Company 2530 Frontier Ave., Boulder, CO 80301 303/440-4544 Fax 303/440-4144	
Date: 12/19/96		<b>KC System for Stereo Stand Mounting</b>	
SIZE <b>B</b>	FSCM NO.	DWG NO.	REV
Modified: 9/2/97	SCALE <b>NONE</b>	<b>KC</b>	SHEET <b>1 OF 1</b>