

PROXIMITY SERIES:

InfiniMini™



InfiniMini™ Video Lenses

General Description. InfiniMini is the first of Infinity Photo-Optical's PROXIMITY Series of application-specific video/machine vision lenses. Input from machine vision specialists was taken into consideration during the design and development of InfiniMini, resulting in a truly innovative C/CS-mount video lens with many unique features. Incorporating a patented Dynamic (internal) Focusing System (DFS), InfiniMini always remains dimensionally stable. InfiniMini's DFS system provides continuous spherical correction with progressive *proximity* to the subject. This means that InfiniMini *improves* its image quality where other lenses suffer aberrational defects.

Converters. InfiniMini consists of a Main Body, to which four rear Converters can be attached. Complete details on each Converter type are contained in tables following this descriptive text.

The **Standard Converter** permits focus from 750mm to 150mm and can be supplemented by the Near Range (NR) Spacer for a magnification of 0.5x at 110mm working distance.

The **IF Converter** is exactly the same size as the Standard Converter (29mm long) and is the most versatile of all. The IF Converter alters InfiniMini optically so that it can focus from infinity down to 314mm. In addition, the IF Converter allows the use of IF-Series and LWD-Series Objectives.

Both Standard and IF Converters are available in basic, lockable, variable aperture and variable aperture/lockable variants. In addition, Right Angle (RA) versions of the Standard and IF Converters allow the InfiniMini to be 90° to the camera axis.

Two small format Converters round out InfiniMini's capabilities. Both are available in regular and lockable mounts:

The **SF Converter** is primarily intended for use with sensors 1/3-in. or smaller to compensate their aspect ratios to be similar to the fields covered with 1/2-in. formats. In addition, the SF Converter provides greater light grasp even when used with 1/2-in. formats.

The **WA Converter** is the same size as the SF Converter and operates from 550mm to 150mm and provides wide fields, particularly with 1/3-in. and smaller formats.

Function. InfiniMini's Focusing Ring activates focus for all converter options. Amplifiers can be mounted to step-up magnification by 2x (one DL or lockable LDL Tube) or 4x (with the lockable LDS Tube). Another unique design feature is that several frontal accessories are available to mount ring lights of various diameters directly to InfiniMini. Since the front objective is recessed, its elongated outer mount serves as a built-in lens shade. By using an optional retaining ring, the lens shade can be used to mount 25mm diameter optical filters.

The Dynamic Focusing System (DFS). A patented internal focusing system has been developed specifically for InfiniMini. As the world leader in internally focused optical instruments, Infinity Photo-Optical Company has now—for the first time—developed a *lens* (as opposed to a full-fledged instrument) which is application-specific. Infinity's other (instrument) products incorporate patented afocally-variable focusing systems—AVS and InFocus—which allow many different configurations for successively different uses and applications. DFS is also a varying system, but is simplified by combining and subsuming the varying principle into the image-forming optics. This results in a less costly optical design, allowing the InfiniMini to be priced substantially lower than our comprehensive instruments. Within its application "envelope," InfiniMini offers optical performance comparable to systems costing many times more, yet it provides new capabilities and conveniences due to its revolutionary concept and design.

Another feature of DFS is its “self-defining” aperture system. As focus is determined, so is the best overall aperture. Automatically, InfiniMini “finds” its optimum imaging potential. As a result, the typical iris diaphragm has been made an *option* rather than a necessity.

Formats. InfiniMini can be used with all C-mount and CS-mount video cameras. If used with CS-mount cameras, a C5 Spacer should be added to compensate for InfiniMini’s standard C-mount back focal distance. InfiniMini covers all 2/3-in. and smaller-sensored cameras (1x to 4x amplification). InfiniMini was not designed for 35mm (T2 mount) or special bayonet formats. For such use, our larger, more adaptable instruments (such as Models KC and K2) are required.

Aperture Options. Although DFS assures an almost perfect image throughout the focusing range, it is sometimes desirable to stop-down aperture for increased depth of field—even if this necessitates some restriction on resolving power. While designing InfiniMini, full consideration was given to this matter, resulting in a supplemental approach to aperture adjustment beyond that automatically provided by DFS. InfiniMini can be equipped with Standard and IF Converters which can vary their apertures by means of built-in Variable Iris Diaphragms. The Variable Iris Diaphragm should be left in its wide-open position when frontal objectives are utilized.

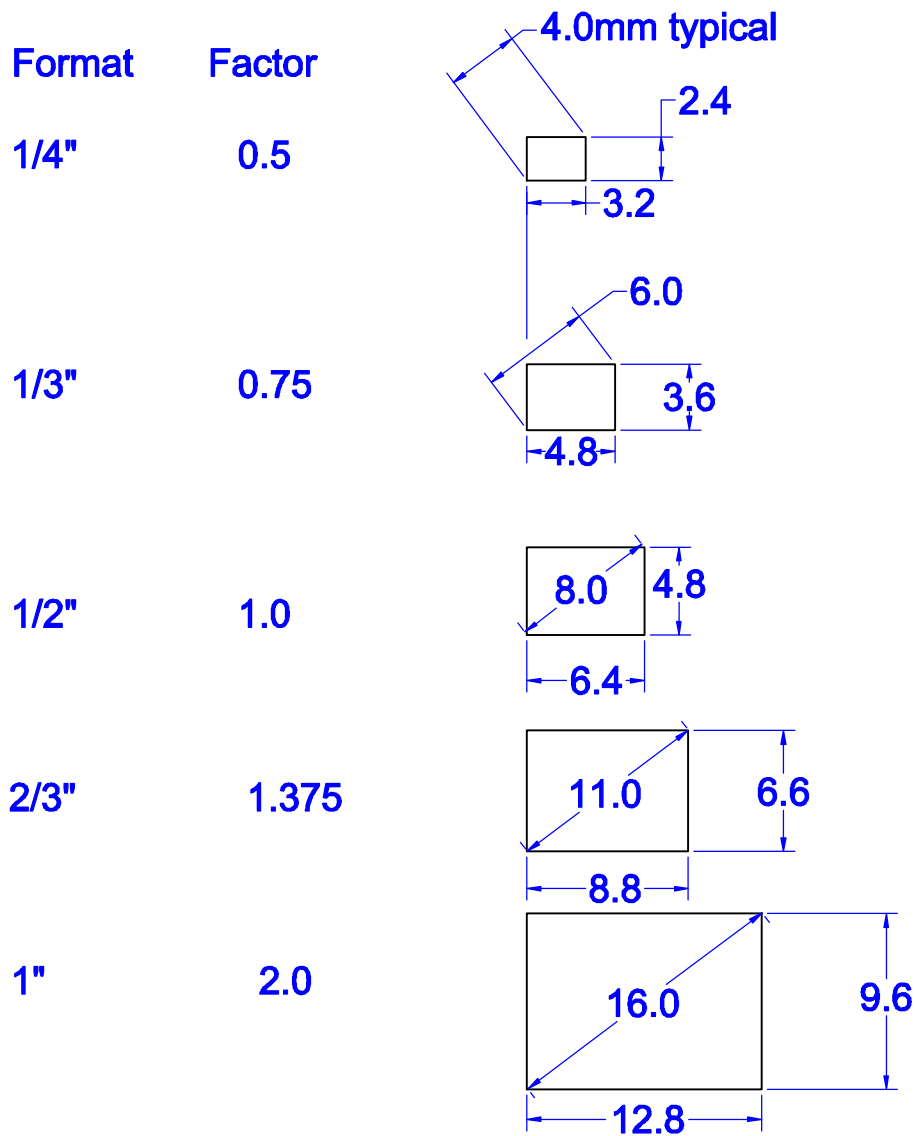
Accessories. Besides Amplifier Tubes for altering magnification and the Supplemental Variable Iris Diaphragm, InfiniMini accepts various frontal adapters for direct connection of ring light illuminators. An Extender permits 30mm and larger ring lights to be mounted, and also serves as a 25mm diameter filter holder. Other adapters for 21, 28mm and 66mm ring lights are also available. The Extender accepts an optional C-Clamp for special mounting requirements. The C-Clamp can also be used atop InfiniMini. The 21mm Fiber Optic Ring Light Adapter is a plastic probe which acts as a variable condenser when a 21mm ring light is moved up-and-down its shaft. This results in a continuous transition from brightfield to darkfield and assists edge detection in many objects which would otherwise defy being easily measured.

As previously mentioned, the **Near-range (NR) Spacer** may be added to the top of the Standard Converter. InfiniMini’s focusing range is reduced to 240mm down to 110mm working distance. However, at 110mm, InfiniMini is set exactly to 0.5x magnification. By using DL, LDL or LDS Tubes above the NR Spacer, the total magnification can range from 0.5x to 1.0x, and then to 2.0x. (See “InfiniMini with NR Spacer” table).

IF-Series and LWD-Series Objectives. IF-Series and LWD-Series Objectives combine with the IF Converter to provide extraordinary close focus magnification options. Three IF-Series Objectives may be used: IF-3, IF-3.5 and IF-4. There are three LWD-Series Objectives, numbered 1 through 3. Each LWD Objective is color-coded in the progression red, green, and blue. From as far as 122mm working distance at 1.08x down to 37mm at 2.56x, LWD-Series Objectives provide exceptional images. All objectives can be amplified by DL, LDL or LDS Tubes.

Care and cleaning. The InfiniMini should be treated as the fine lens that it is. Care should be taken to keep dust and dirt off external lens surfaces. 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.

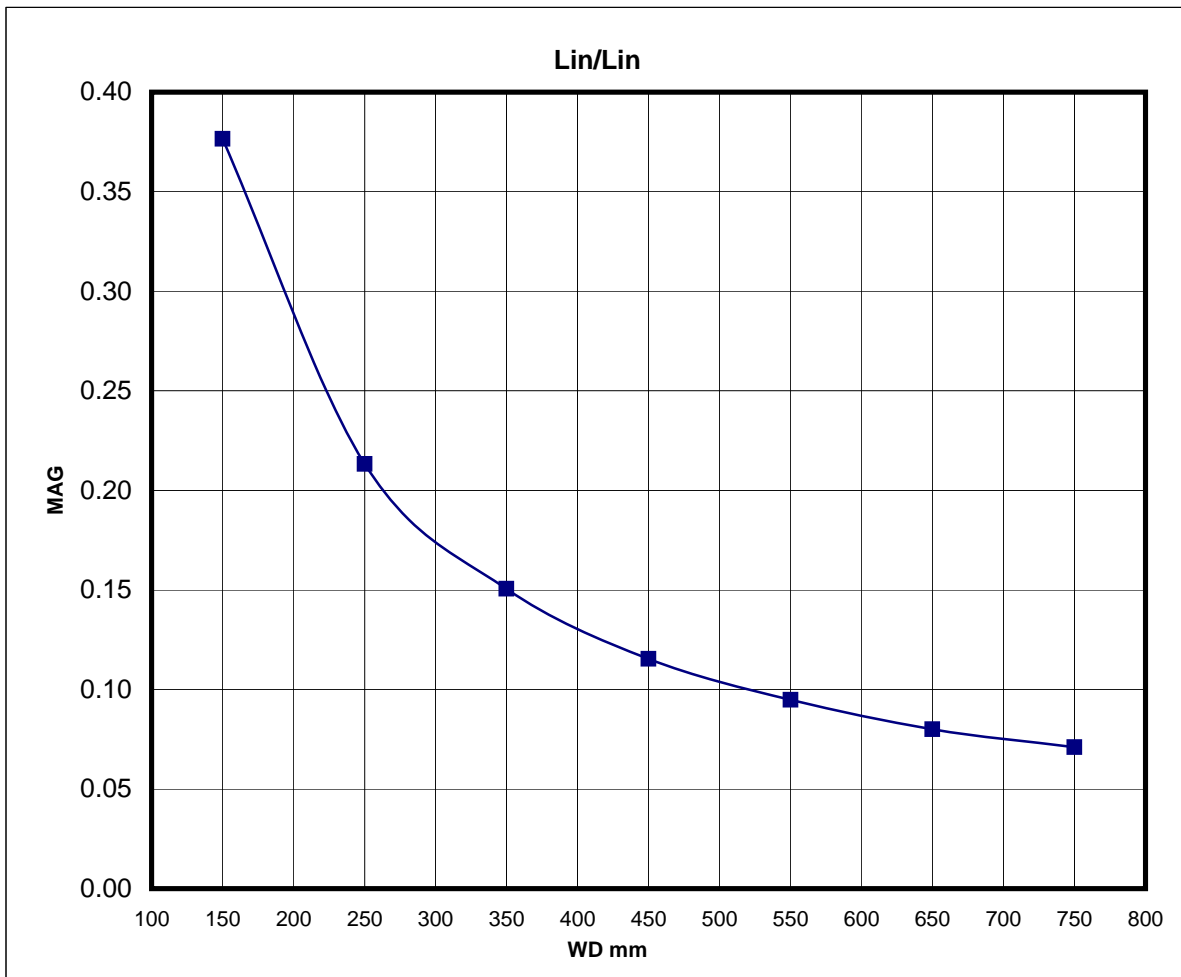
Video Formats



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

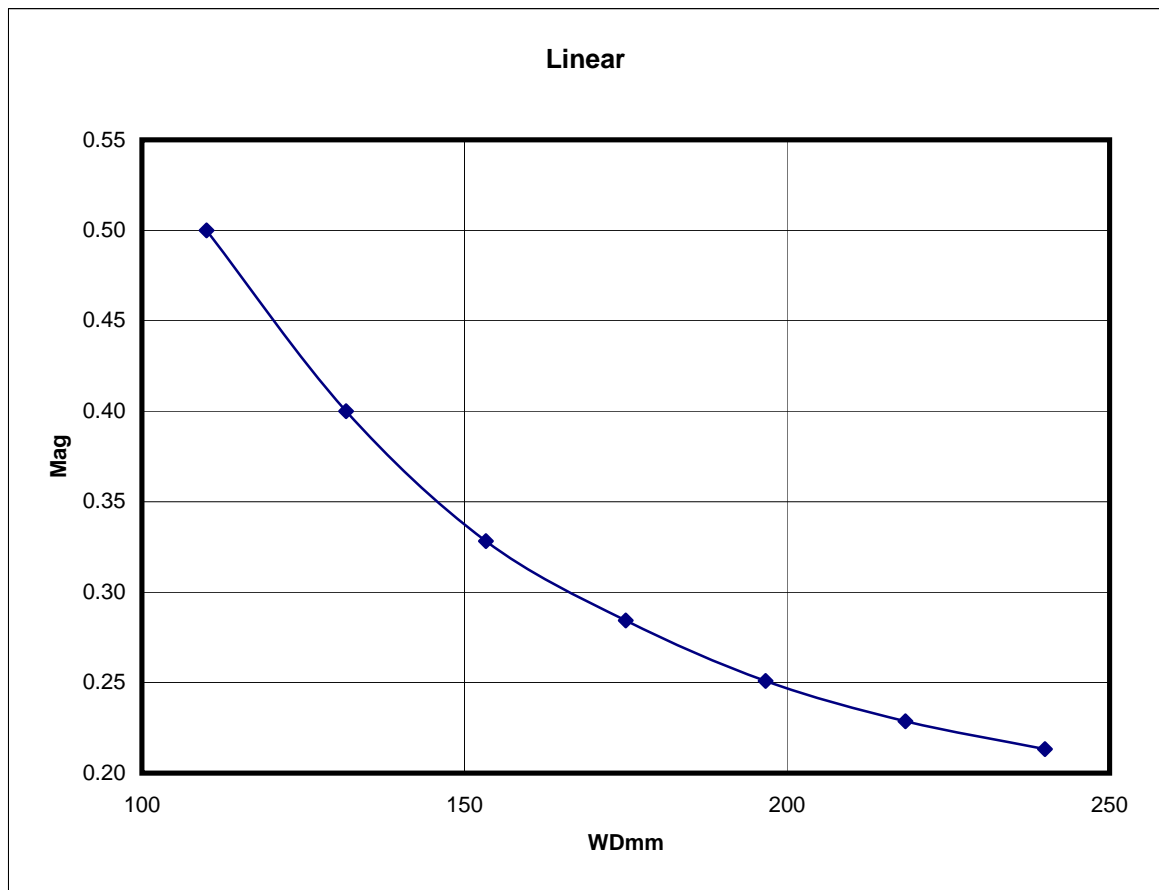
INFINIMINI OPTICAL DATA WITH STANDARD CONVERTER

| | | | | | | | | |
|-------------------|-----------------|-------|-------|-------|-------|--------|--------|--------|
| InfiniMini | WD mm | 150 | 250 | 350 | 450 | 550 | 650 | 750 |
| Direct | Mag | 0.38 | 0.21 | 0.15 | 0.12 | 0.09 | 0.08 | 0.07 |
| | FOV 2/3" | 25.50 | 45.00 | 63.75 | 83.25 | 101.25 | 120.00 | 135.00 |
| | FOV 1/2" | 17.00 | 30.00 | 42.50 | 55.50 | 67.50 | 80.00 | 90.00 |
| | FOV 1/3" | 12.75 | 22.50 | 31.88 | 41.63 | 50.63 | 60.00 | 67.50 |
| | | | | | | | | |
| | WD mm | 150 | 250 | 350 | 450 | 550 | 650 | 750 |
| DL or LDL | Mag | 0.75 | 0.43 | 0.30 | 0.23 | 0.19 | 0.16 | 0.14 |
| | FOV 2/3" | 12.75 | 22.50 | 31.88 | 41.63 | 50.63 | 60.00 | 67.50 |
| | FOV 1/2" | 8.50 | 15.00 | 21.25 | 27.75 | 33.75 | 40.00 | 45.00 |
| | FOV 1/3" | 6.38 | 11.25 | 15.94 | 20.81 | 25.31 | 30.00 | 33.75 |
| | | | | | | | | |
| | WD mm | 150 | 250 | 350 | 450 | 550 | 650 | 750 |
| LDS | Mag | 1.5 | 0.9 | 0.6 | 0.5 | 0.4 | 0.3 | 0.3 |
| | FOV 2/3" | 6.38 | 11.25 | 15.94 | 20.81 | 25.31 | 30.00 | 33.75 |
| | FOV 1/2" | 4.25 | 7.50 | 10.63 | 13.88 | 16.88 | 20.00 | 22.50 |
| | FOV 1/3" | 3.19 | 5.63 | 7.97 | 10.41 | 12.66 | 15.00 | 16.88 |



INFINIMINI OPTICAL DATA WITH STANDARD CONVERTER AND NR SPACER

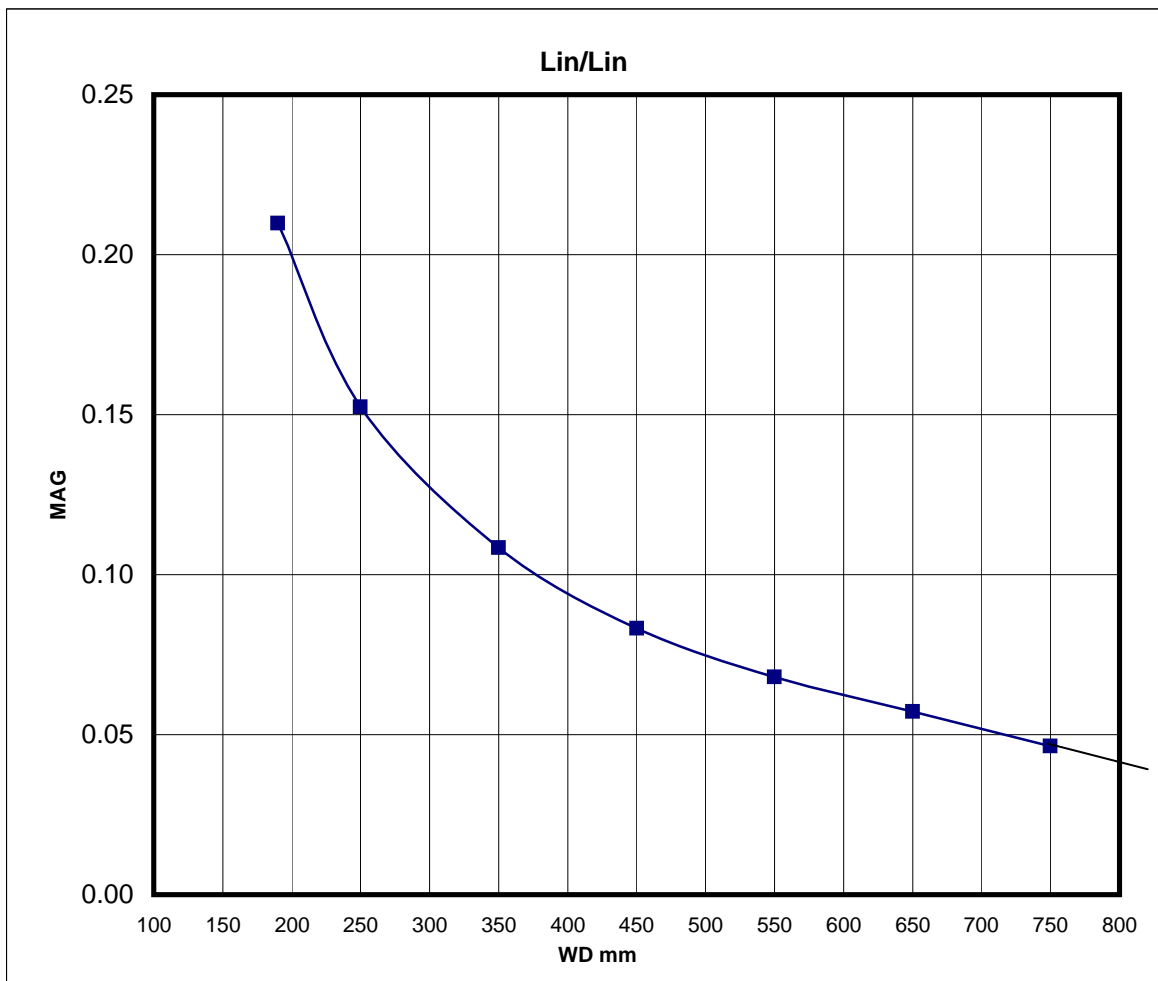
| | | | | | | | | |
|-----------------------|-----------------|-------|-------|-------|-------|-------|-------|-------|
| InfiniMini | WD mm | 110 | 132 | 153 | 175 | 197 | 218 | 240 |
| With NR Spacer | Mag | 0.50 | 0.40 | 0.33 | 0.28 | 0.25 | 0.23 | 0.21 |
| | FOV 2/3" | 19.20 | 24.00 | 29.25 | 33.75 | 38.25 | 42.00 | 45.00 |
| | FOV 1/2" | 12.80 | 16.00 | 19.50 | 22.50 | 25.50 | 28.00 | 30.00 |
| | FOV 1/3" | 9.60 | 12.00 | 14.63 | 16.88 | 19.13 | 21.00 | 22.50 |
| | | | | | | | | |
| | WD mm | 110 | 132 | 153 | 175 | 197 | 218 | 240 |
| DL or LDL | Mag | 1.0 | 0.8 | 0.7 | 0.6 | 0.5 | 0.5 | 0.4 |
| | FOV 2/3" | 9.60 | 12.00 | 14.63 | 16.88 | 19.13 | 21.00 | 22.50 |
| | FOV 1/2" | 6.40 | 8.00 | 9.75 | 11.25 | 12.75 | 14.00 | 15.00 |
| | FOV 1/3" | 4.80 | 6.00 | 7.31 | 8.44 | 9.56 | 10.50 | 11.25 |
| | | | | | | | | |
| | WD mm | 110 | 132 | 153 | 175 | 197 | 218 | 240 |
| LDS | Mag | 2.0 | 1.6 | 1.3 | 1.1 | 1.0 | 0.9 | 0.9 |
| | FOV 2/3" | 4.80 | 6.00 | 7.31 | 8.44 | 9.56 | 10.50 | 11.25 |
| | FOV 1/2" | 3.20 | 4.00 | 4.88 | 5.63 | 6.38 | 7.00 | 7.50 |
| | FOV 1/3" | 2.40 | 3.00 | 3.66 | 4.22 | 4.78 | 5.25 | 5.63 |



Note: Chart magnifications double for each DL Tube added.

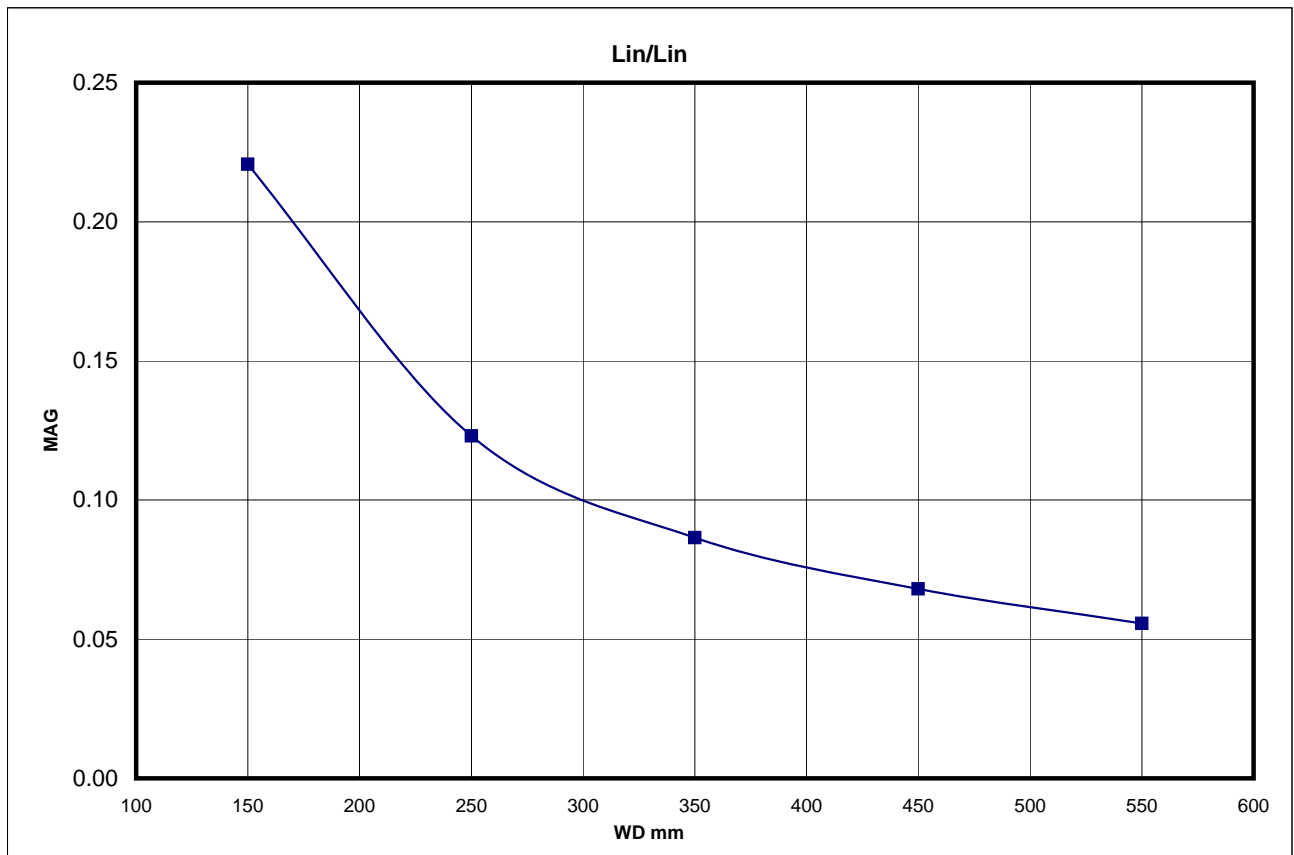
INFINIMINI WITH SF CONVERTER

| | | | | | | | | |
|----------------------|-----------------|-------|-------|-------|--------|--------|--------|--------|
| InfiniMini/SF | WD mm | 190 | 250 | 350 | 450 | 550 | 650 | 750 |
| Direct | Mag | 0.21 | 0.15 | 0.11 | 0.08 | 0.07 | 0.06 | 0.05 |
| | FOV 2/3" | 45.75 | 63.00 | 88.50 | 115.50 | 141.00 | 168.00 | 207.00 |
| | FOV 1/2" | 30.50 | 42.00 | 59.00 | 77.00 | 94.00 | 112.00 | 138.00 |
| | FOV 1/3" | 22.88 | 31.50 | 44.25 | 57.75 | 70.50 | 84.00 | 103.50 |
| | | | | | | | | |
| | WD mm | 190 | 250 | 350 | 450 | 550 | 650 | 750 |
| DL or LDL | Mag | 0.42 | 0.30 | 0.22 | 0.17 | 0.14 | 0.11 | 0.09 |
| | FOV 2/3" | 22.88 | 31.50 | 44.25 | 57.75 | 70.50 | 84.00 | 103.50 |
| | FOV 1/2" | 15.25 | 21.00 | 29.50 | 38.50 | 47.00 | 56.00 | 69.00 |
| | FOV 1/3" | 11.44 | 15.75 | 22.13 | 28.88 | 35.25 | 42.00 | 51.75 |
| | | | | | | | | |
| | WD mm | 190 | 250 | 350 | 450 | 550 | 650 | 750 |
| LDS | Mag | 0.84 | 0.61 | 0.43 | 0.33 | 0.27 | 0.23 | 0.19 |
| | FOV 2/3" | 11.44 | 15.75 | 22.13 | 28.88 | 35.25 | 42.00 | 51.75 |
| | FOV 1/2" | 7.63 | 10.50 | 14.75 | 19.25 | 23.50 | 28.00 | 34.50 |
| | FOV 1/3" | 5.72 | 7.88 | 11.06 | 14.44 | 17.63 | 21.00 | 25.88 |



INFINIMINI OPTICAL DATA with WA CONVERTER

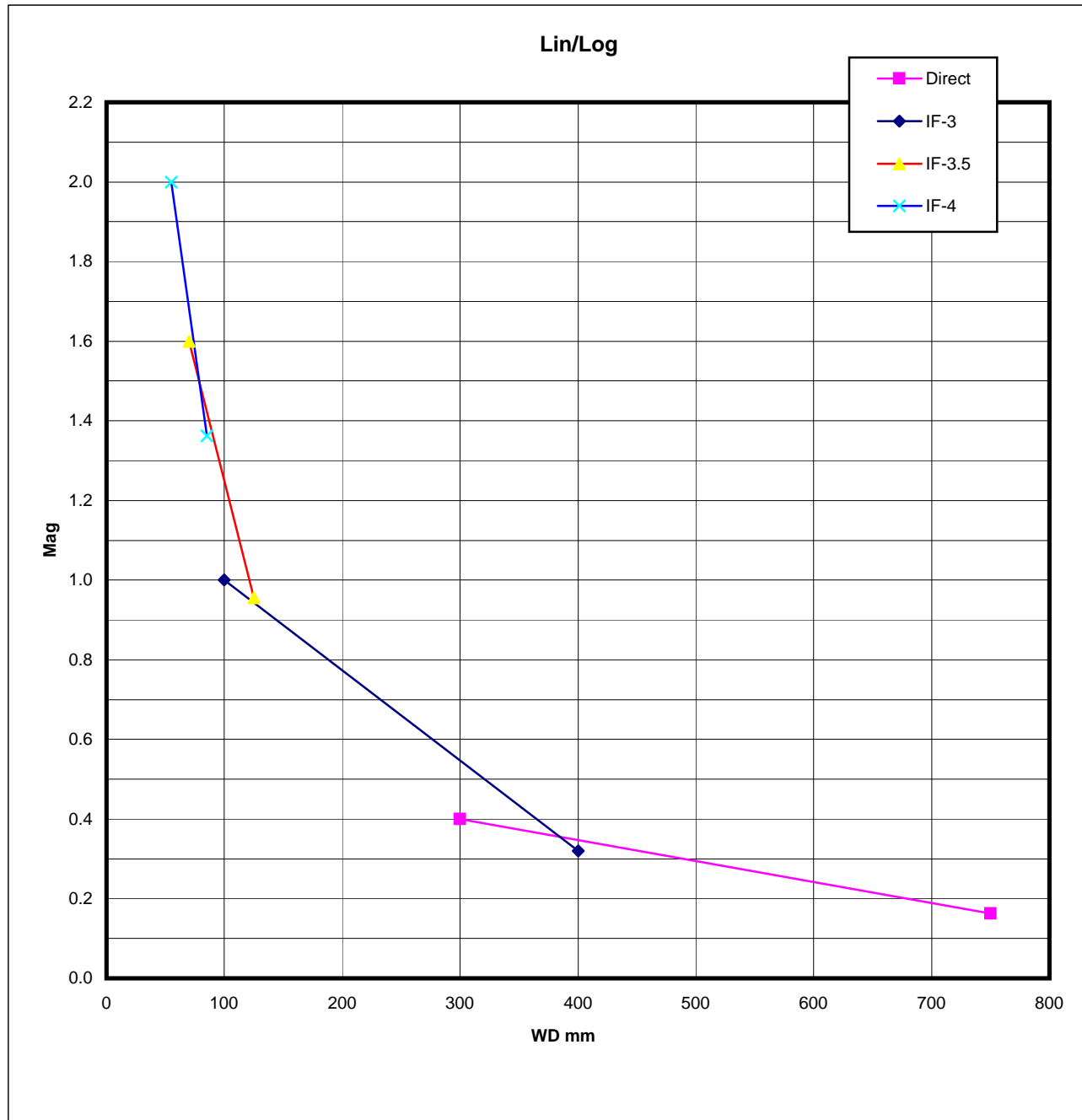
| | | | | | | |
|-------------------|-----------------|-------|-------|--------|--------|--------|
| InfiniMini | WD mm | 150 | 250 | 350 | 450 | 550 |
| Direct | Mag | 0.22 | 0.12 | 0.09 | 0.07 | 0.06 |
| | FOV 2/3" | 43.50 | 78.00 | 111.00 | 141.00 | 172.50 |
| | FOV 1/2" | 29.00 | 52.00 | 74.00 | 94.00 | 115.00 |
| | FOV 1/3" | 21.75 | 39.00 | 55.50 | 70.50 | 86.25 |
| | | | | | | |
| | WD mm | 150 | 250 | 350 | 450 | 550 |
| DL or LDL | Mag | 0.44 | 0.25 | 0.17 | 0.14 | 0.11 |
| | FOV 2/3" | 21.75 | 39.00 | 55.50 | 70.50 | 86.25 |
| | FOV 1/2" | 14.50 | 26.00 | 37.00 | 47.00 | 57.50 |
| | FOV 1/3" | 10.88 | 19.50 | 27.75 | 35.25 | 43.13 |
| | | | | | | |
| | WD mm | 150 | 250 | 350 | 450 | 550 |
| LDS | Mag | 0.88 | 0.49 | 0.35 | 0.27 | 0.22 |
| | FOV 2/3" | 10.88 | 19.50 | 27.75 | 35.25 | 43.13 |
| | FOV 1/2" | 7.25 | 13.00 | 18.50 | 23.50 | 28.75 |
| | FOV 1/3" | 5.44 | 9.75 | 13.88 | 17.63 | 21.56 |



INFINIMINI WITH IF-SERIES OBJECTIVES / IF CONVERTER

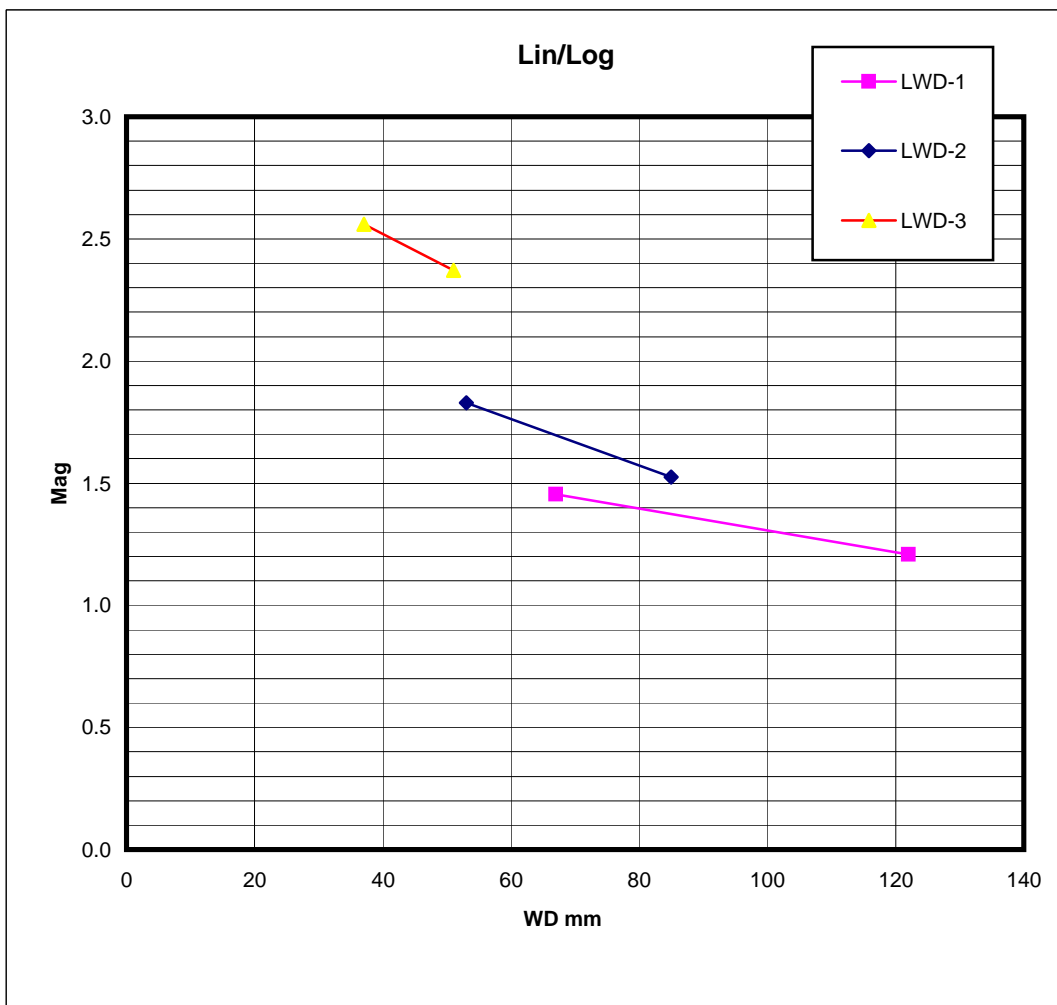
| InfiniMini | Direct | | IF-3 | | IF-3.5 | | IF-4 | |
|--------------------|--------|-------|------|-------|--------|-------|------|------|
| w/IF Objectives | Near | Far | Near | Far | Near | Far | Near | Far |
| WD mm | 300 | 750 | 100 | 400 | 70 | 125 | 55 | 85 |
| MAG | 0.4 | 0.16 | 1.0 | 0.3 | 1.6 | 1.0 | 2.0 | 1.4 |
| FOV mm 2/3" | 24.00 | 59.25 | 9.60 | 30.00 | 6.00 | 10.05 | 4.80 | 7.05 |
| FOV mm 1/2" | 16.00 | 39.50 | 6.40 | 20.00 | 4.00 | 6.70 | 3.20 | 4.70 |
| FOV mm 1/3" | 12.00 | 29.63 | 4.80 | 15.00 | 3.00 | 5.03 | 2.40 | 3.53 |

Note: InfiniMini does not require IF-1 or IF-2 from the IF-Series



INFINIMINI W/IF CONVERTER AND LWD OBJECTIVES

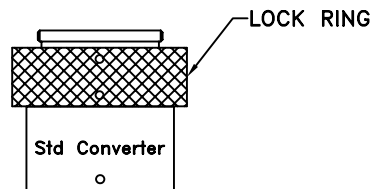
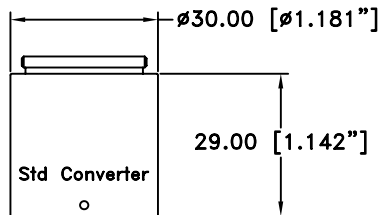
| InfiniMini | LWD-1 | | LWD-2 | | LWD-3 | |
|--------------------|-------|------|-------|------|-------|------|
| w/IF Objectives | Near | Far | Near | Far | Near | Far |
| WD mm | 67 | 122 | 53 | 85 | 37 | 51 |
| MAG | 1.5 | 1.21 | 1.8 | 1.5 | 2.6 | 2.4 |
| FOV mm 2/3" | 6.60 | 7.95 | 5.25 | 6.30 | 3.75 | 4.05 |
| FOV mm 1/2" | 4.40 | 5.30 | 3.50 | 4.20 | 2.50 | 2.70 |
| FOV mm 1/3" | 3.30 | 3.98 | 2.63 | 3.15 | 1.88 | 2.03 |



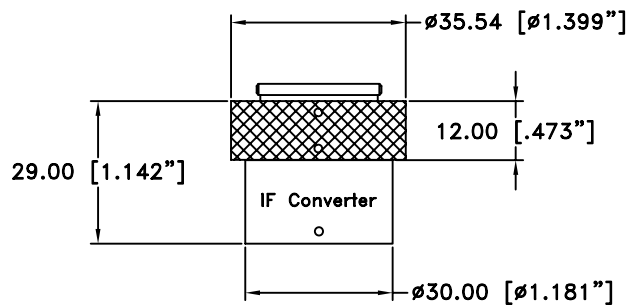
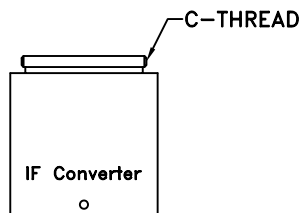
| REVISIONS | | | | |
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| ZONE | REV | DESCRIPTION | DATE | APPROVED |
| | | | | |

Straight Converter Options

STD CONVERTERS:



IF CONVERTERS:



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

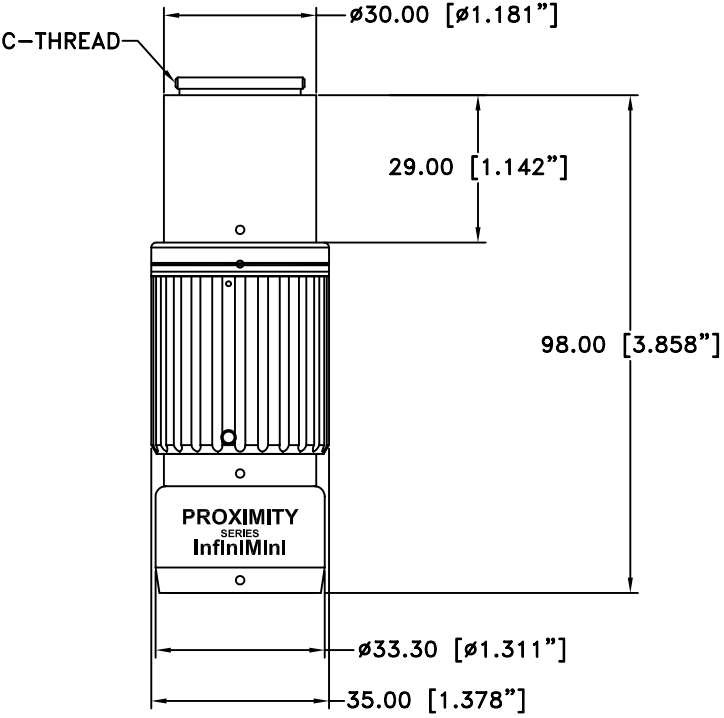
INFINITY Photo-Optical Company
2530 Frontier Ave., Boulder, CO 80301
303/440-4544 Fax 303/440-4144

INFINIMINI CONVERTERS

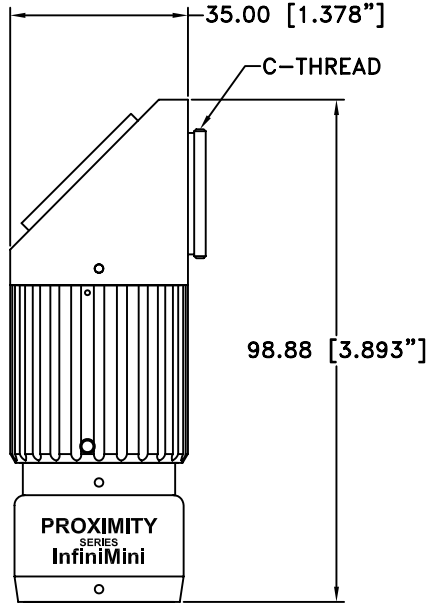
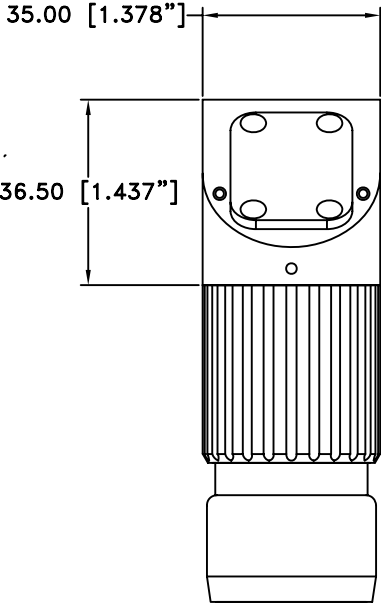
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| Modified: 10/23/08 MB | SCALE NONE | SHEET - | | |

| REVISIONS | | | | |
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| ZONE | REV | DESCRIPTION | DATE | APPROVED |
| | | | | |

w/REGULAR CONVERTERS:



BASIC MODEL



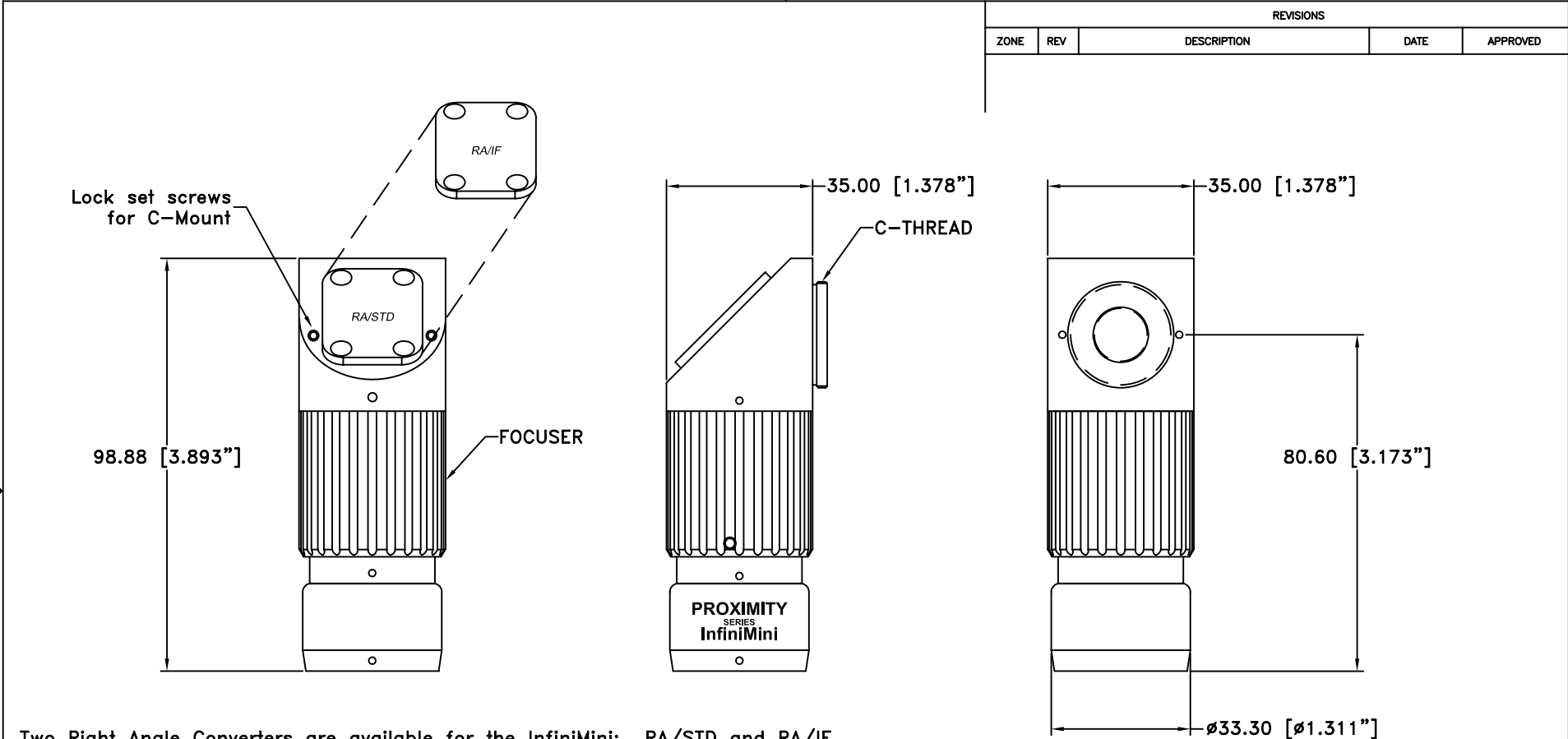
w/RIGHT ANGLE

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

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

INFINIMINI SERIES CONFIGURATION

| | | | | |
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| Date: 09/03/98 MS | SIZE B | FSCM NO. | DWG NO. | REV D |
| Modified: 10/23/08 MB | SCALE NONE | SHEET - | | |



| REVISIONS | | | | |
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| ZONE | REV | DESCRIPTION | DATE | APPROVED |
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Two Right Angle Converters are available for the InfiMini: RA/STD and RA/IF. Except for the fact that the beam is diverted 90° from the InfiMini's axis, they function the same as their straight counterparts.

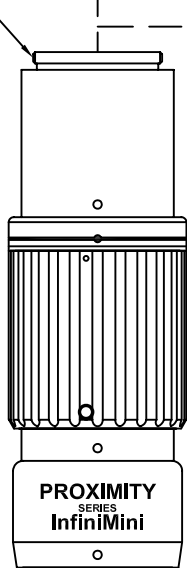
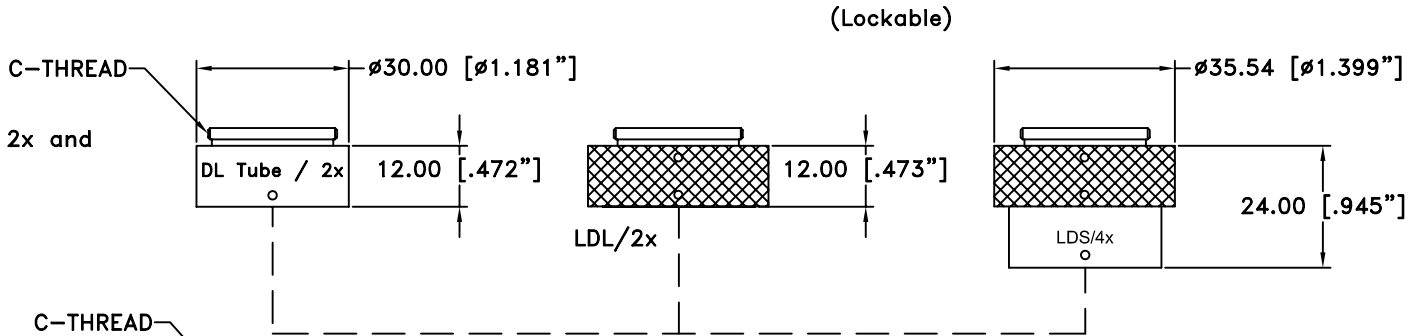
The RA Converters allow horizontal camera positioning where space limitations preclude a direct vertical setup. Alternatively, RA Converters allow the InfiMini to be positioned horizontally with the camera in the vertical position.

One of the set screw holes can be used as the counter reference to the dot on the fluted focusing ring.

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| ALL DIM ARE mm [inches] AND ARE FOR REFERENCE ONLY AND ARE SUBJECT TO CHANGE. | | INFINITY Photo-Optical Company 2530 Frontier Ave., Boulder, CO 80301 303/440-4544 Fax 303/440-4144 | | |
| INFINIMINI w/RA CONVERTER | | | | |
| Date: 07/02/99 MS | SIZE B | FSCM NO. | DWG NO. | REV B |
| Modified: 10/23/08 MB | SCALE NONE | SHEET - | | |

| REVISIONS | | | | |
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| ZONE | REV | DESCRIPTION | DATE | APPROVED |
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Amplifiers: Factors are 2x and 4x respectively.

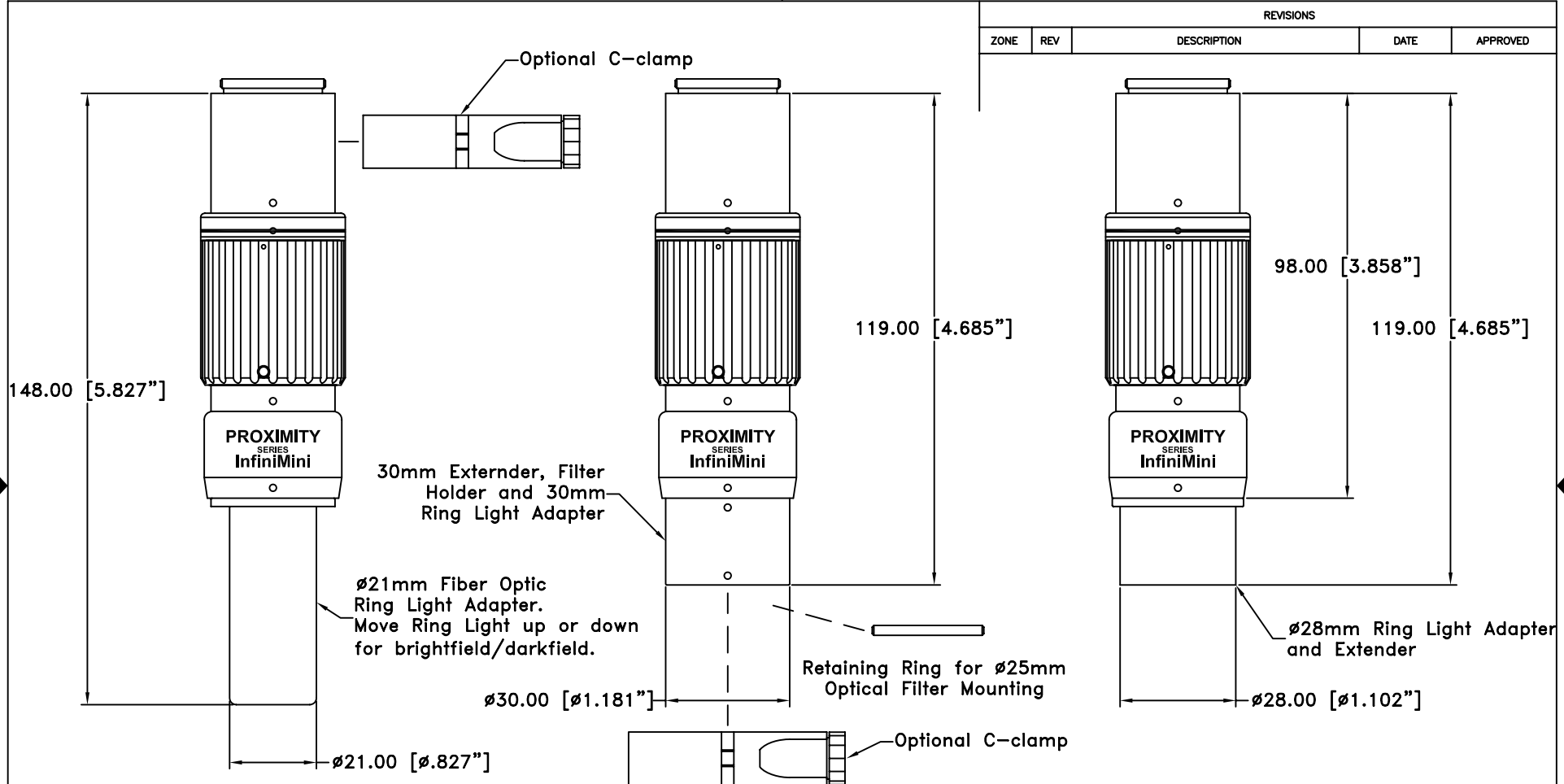


ALL DIM ARE mm [inches] AND ARE FOR REFERENCE ONLY AND ARE SUBJECT TO CHANGE.

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 303/440-4544 Fax 303/440-4144

INFINIMINI AMPLIFIERS

| | | | | |
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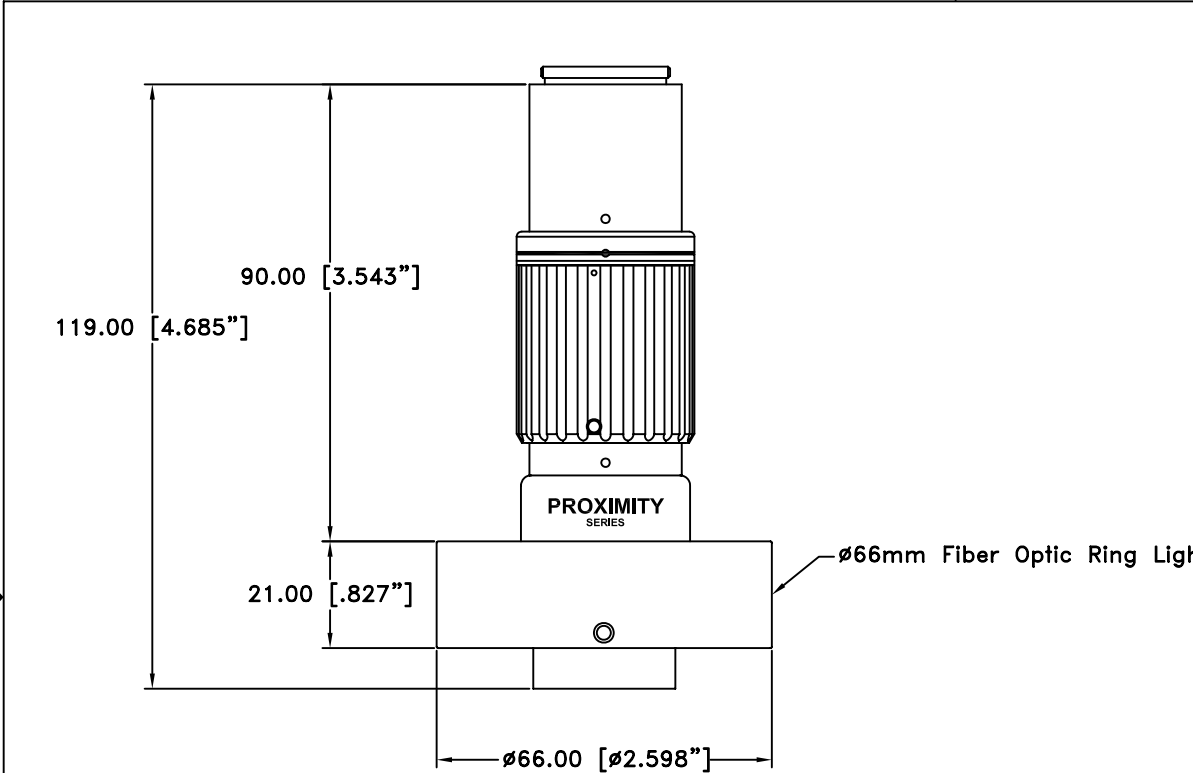


| REVISIONS | | | | |
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| ZONE | REV | DESCRIPTION | DATE | APPROVED |

Note 1: The $\varnothing 30\text{mm}$ and $\varnothing 28\text{mm}$ extenders can be used to distend any light adapters. Only the $\varnothing 30\text{mm}$ Extender can be used with the optional C-clamp.

Note 2: When the $\varnothing 21\text{mm}$ Fiber Optic Ring Light Adapter is used with suitable ring lights, one or two additional extenders may be required. This is dependent on whether the ring light has a parallel or converging fiber beam orientation.

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|--|--|---|----------|---------|
| ALL DIM ARE mm [inches] AND ARE FOR REFERENCE ONLY AND ARE SUBJECT TO CHANGE. | | INFINITY Photo-Optical Company 2530 Frontier Ave., Boulder, CO 80301 303/440-4544 Fax 303/440-4144 | | |
| INFINIMINI ACCESSORIES | | | | |
| Date: 09/03/98 MS | | SIZE B | FSCM NO. | DWG NO. |
| Modified: 10/27/08 MB | | SCALE NONE | SHEET - | |
| | | REV B | | |

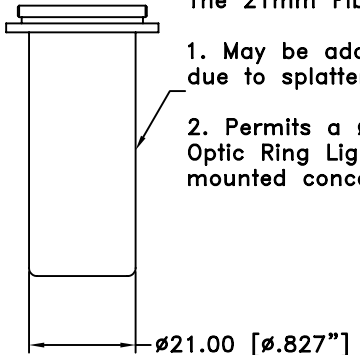


| REVISIONS | | | | |
|-----------|-----|-------------|------|----------|
| ZONE | REV | DESCRIPTION | DATE | APPROVED |
| | | | | |

66mm Fiber Optic Ring Light Adapter

The 21mm Fiber Optic Adapter:

1. May be added to prevent contamination due to splattering, etc.
2. Permits a 21mm Fiber Optic Ring Light to be mounted concentrically.



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

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

INFINIMINI w/66mm FO ADAPTER

| | | | | |
|-----------------------|------------|----------|---------|-------|
| Date: July 15, 1998 | SIZE B | FSCM NO. | DWG NO. | REV B |
| Modified: 10/27/08 MB | SCALE NONE | SHEET - | | |

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.