User's Manual

DAGE-MTI

IR-1000

IR CCD Camera

Purchaser's Record

Model Name: ***DAGE-MTI IR-1000***

Serial Number:

Dealer's Name:

Dealer's Address:

Dealer's Phone Number:

Date Purchased:

P.O. Number:

Introduction

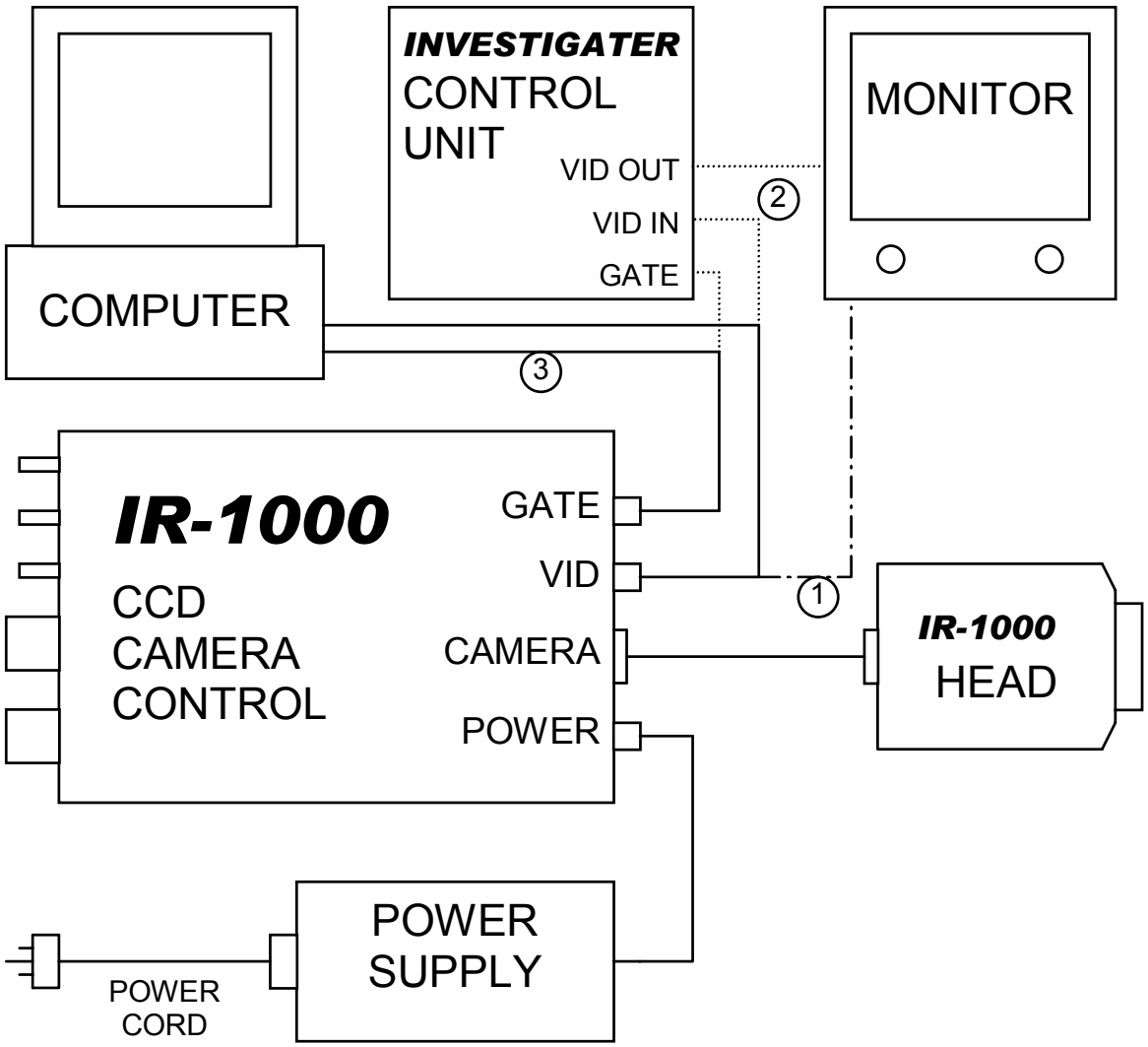
The ***DAGE-MTI IR-1000*** camera system is based upon a 1/2" Interline CCD that produces high-resolution imaging into the near IR spectrum. The CCD employs a state of the art microlens design to increase the light gathering capability of the CCD. The simplistic front panel design of the ***IR-1000*** control unit allows easy access to the Gain and Black Level controls that provide a vast adjustment range. A Test switch provides a stair step pattern for rapid calibration or troubleshooting of the attached equipment such as a monitor or frame grabber. The read-out of the sensor can be inhibited by an external Gate pulse, which allows increased integration times in low-light level situations.

The flexibility of the ***DAGE-MTI IR-1000*** camera system makes it the camera of choice in almost any imaging situation.

DAGE-MTI *offers our customers state-of-the-art video technology… with an eye on your image.*

Installation

The ***IR-1000*** camera head connects directly into the control unit. Power for the control is supplied by an external switching supply that is provided. Ensure that a correct AC power cord is used in accordance with local safety standards. All power and interconnections to the ***IR-1000*** camera head are supplied through the single interface cable. Gating can be accomplished by simply using the ***DAGE-MTI Investigater*** to control the gate time, display and store the image, or by using a computer with a frame grabber. Figure 1 shows some typical setups of the ***IR-1000.***



1. IR-1000 VID OUT CONNECTED TO MONITOR. CAMERA OPERATION IN 'NON GATING' REAL TIME MODE.
2. IR-1000 CONNECTED TO INVESTIGATER CONTROL UNIT. GATING AND FRAME STORE OPERATION CONTROLLED BY INVESTIGATER CONTROL UNIT.
3. IR-1000 CONNECTED TO A COMPUTER. GATING AND FRAME STORE OPERATION CONTROLLED BY COMPUTER.

Figure 1: IR-1000 Connections

Figure 2: IR-1000 Control Rear Panel

Power

Connect the external switching supply to the rear panel's ***POWER*** connector and to a suitable power source in the range of 95VAC to 250VAC. **Ensure that an approved AC cord is used to attach the supply to the AC mains.**

Camera

This 12-pin 'Hirose' connector supplies all of the power and interface to the ***IR-1000*** camera head. Always ensure that the camera head is attached to the control unit before turning the control unit on.

NOTE:

The interconnect cable between the camera head and the control unit has different sex connectors. The control unit end has a yellow stripe labeled "CCU". Be certain to use the correct cable end at the control unit and head in order to avoid damage, which could void the warrantee.

Video

This ‘BNC’ connector supplies video output of the ***IR-1000*** system. The signal is 1Vp-p terminated into 75Ω. Be careful to avoid double termination of the output video, which would result in incorrect video levels. Connect to a monitor, computer or the ***DAGE-MTI Investigater*** as required.

NOTE:

Do not use the *VIDEO OUT* connector on the camera head. This will cause incorrect video levels to be sent to the control and the signal at the camera head will be double terminated.

Gate

This ‘BNC’ connector can be used to provide input of a gate pulse in order to increase the sensitivity by inhibiting the readout of the CCD's image and allowing light to gather in the CCD for extended periods of time before readout. Connect to a computer or the ***DAGE-MTI Investigater***.

Operation

Figure 3: IR-1000 Control Front Panel

Power

This switch controls the power to the ***IR-1000***. The green light indicates when the power is on.

Test

The ***TEST*** switch provides a 10-step stair pattern for rapid calibration or troubleshooting of the attached equipment such as a monitor or frame grabber. With the ***TEST*** switch on, adjust the monitor or frame grabber until the whitest step is just under the point of saturation and the darkest step is as dark as possible while visible without clipping.

Gain

The ***GAIN*** of the ***IR-1000*** can be either in a manually adjustable or in an automatic mode. In ***AUTO***, the output of the camera is determined by the internal automatic gain control (AGC) circuitry, which will adjust the camera gain in order to keep the output signal at a full level. This is particularly useful when viewing low contrast highlights and rotating the Black Level control to stretch the low contrast highlights into a signal that is easier to examine.

Black Level

The black level output is determined by this control. When set to ***MAX***, the output video resides on a standard 50mV black pedestal. The ***BLACK LEVEL*** control range allows blacks to be pulled down so that whites can be contrast enhanced and stretched. Using this mode with the ***GAIN*** control in ***AUTO*** stretches the portion of the signal that is of interest. When using external gating, the ***BLACK LEVEL*** control is useful for removing unwanted light offsets due to effects such as lens scattering and low level background light.

Microscope Use

A. Initial Set-up:

1. Set switches on rear of camera head as follows: ***SHUTTER*** to ***OFF***, ***FIELD/FRAME*** to ***FRAME***.
2. Use the ***TEST*** signal to adjust the associated equipment as outlined in the **"Test"** section on the previous page.

B. All Forms of Transmitted Light:

1. Set ***GAIN*** to ***AUTO*** and ***BLACK LEVEL*** to ***MAX***.
2. Adjust light so white highlights are just under saturation.
3. Turn ***BLACK LEVEL*** control for the proper contrast.

C. Live or Real-time Fluorescence:

1. Set for best visual fluorescence using eyepieces.
2. Set ***GAIN*** to ***AUTO*** and ***BLACK LEVEL*** to ***MAX***.
3. Turn ***BLACK LEVEL*** control for best black background.

D. Gated low Light Level Fluorescence:

1. Follow steps 1-3 in part C above for live fluorescence.
2. Set ***GAIN*** to ***MAN*** and control to ***MIN***.
3. Select Gate (Integration) time and initiate.

Note: Increasing ***MAN GAIN*** can shorten the Gate time. However, this may cause the image to be very noisy.

Gating

The ***IR-1000*** camera system can be externally gated in order to increase the sensitivity. Inhibiting the readout of the CCD's image allows light to gather in the CCD for extended periods of time. An external gating pulse defines the gate time of the camera through the ***GATE*** connector. Gating can be accomplished by simply using the ***DAGE-MTI Investigater***, or by using a computer. If a computer is used, follow the timing recommendations as follows.

The timing of the External Gate pulse requires that the pulse occur sometime during the field immediately before the CCD readout is to be inhibited. Figure 4 shows the relationship of the CCD transfer to the output video signal.

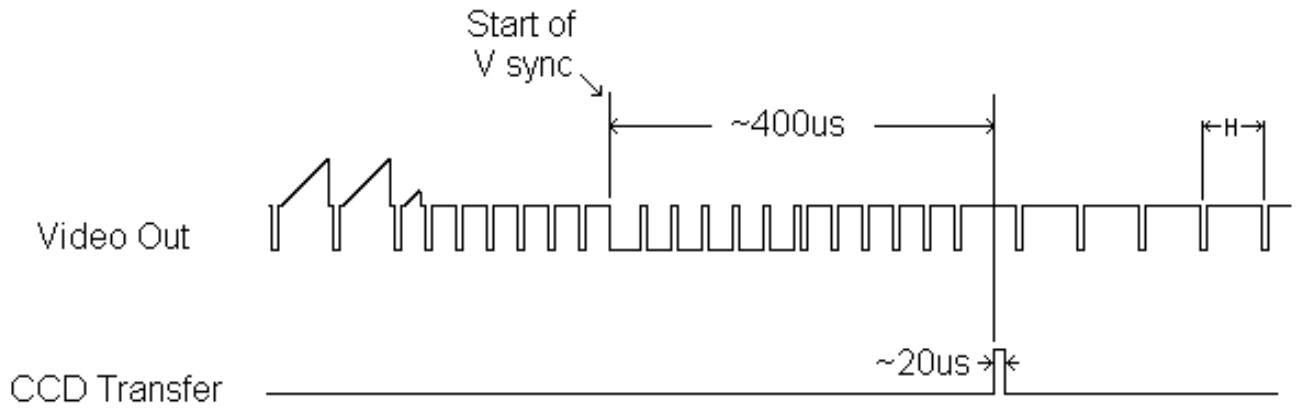


Figure 4: Video to CCD Transfer Timing

As long as the gate pulse edges occur ***before*** the CCD transfer, the correct timing will occur. Care should be taken to ensure that the CCD is gated for an ***even number of fields***. If an odd number of fields are gated, the resultant image will differ in intensity between the two fields.

To inhibit the readout of the CCD, simply ground the center pin on the ***GATE*** connector. The camera will readout the two fields ***immediately*** following the ground release of the ***CCD Gate*** signal. The ***CCD Gate*** input is compatible with standard CMOS type logic interfaces.

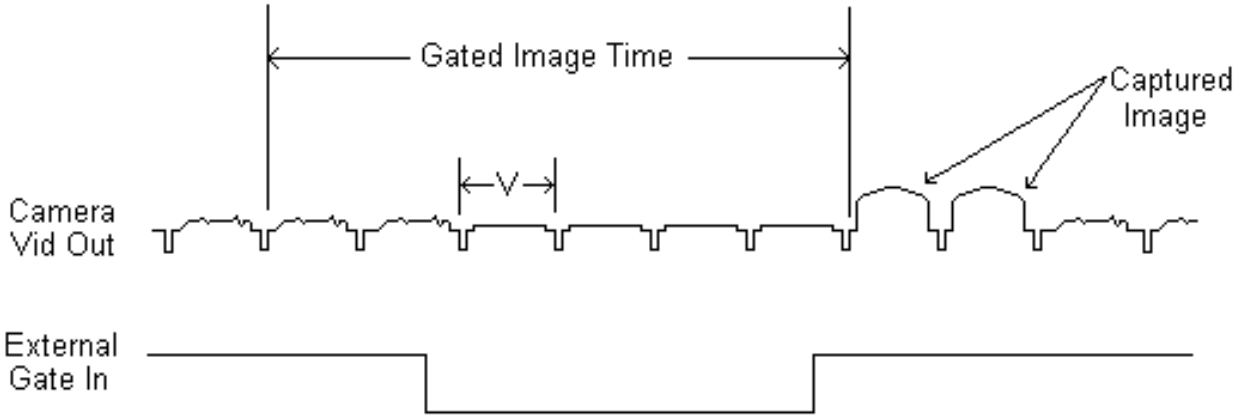


Figure 5: External Gate Timing & Video Readout

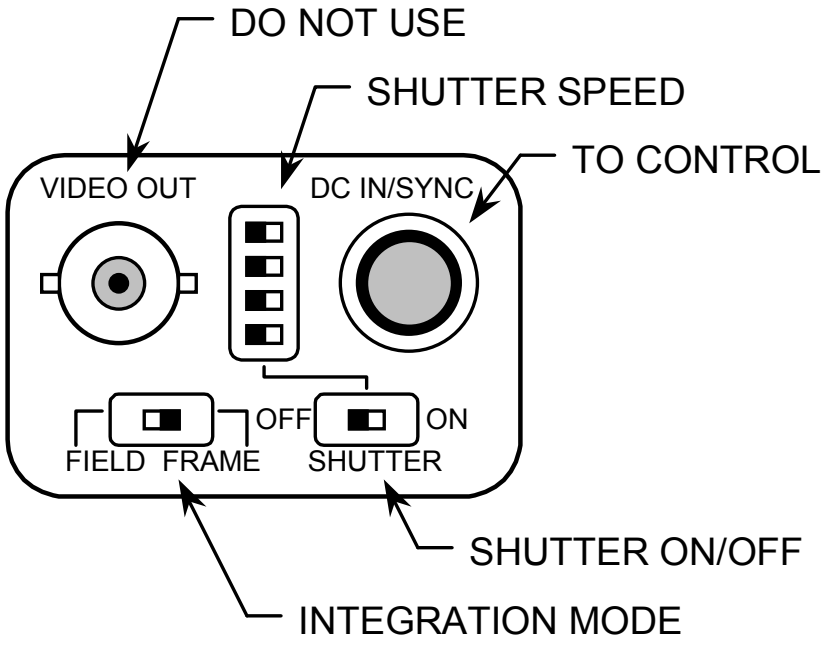
NOTE:

When utilizing gating, the ***SHUTTER*** control on the Camera Head must be ***OFF*** and the ***FIELD/FRAME*** switch must be set to ***FRAME***. Also the Control Units' ***GAIN*** switch should be set to ***MAN***, and the ***GAIN*** control should be set at ***MIN*** in order to keep the image from becoming too noisy.

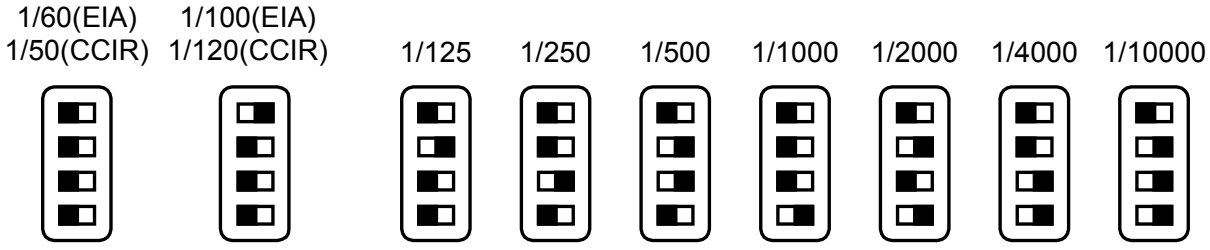
Electronic Shutter

The ***IR-1000*** camera system can be shuttered in order to decrease the sensitivity. If electronic shuttering is desired, turn the ***SHUTTER*** switch to ***ON*** and use the following diagram to set the ***SHUTTER SPEED*** switch.

CAMERA HEAD REAR PANEL



SHUTTER SPEED (SECONDS)

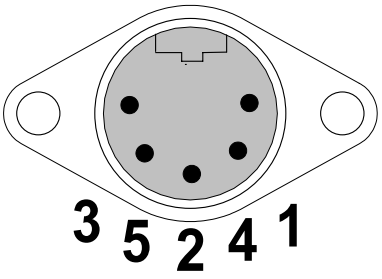


NOTE: THE BLACK SQUARE INDICATES THE SWITCH TAB POSITION

Figure 6: Electronic Shutter Settings

Connector Pin-outs

Power



This 5-pin 'DIN' connector receives DC power from the external switching power supply. The supply plugs into an appropriate AC outlet and provides all of the necessary voltages to the ***IR-1000***. Pin-out of the ***POWER*** Connector is as follows:

PIN #	***FUNCTION***
1	***GND***
2	***GND***
3	***N/C***
4	***-12V Power In*** *(-12VDC @ 25mA)*
5	***+12V Power In*** *(+12VDC @ 275mA)*

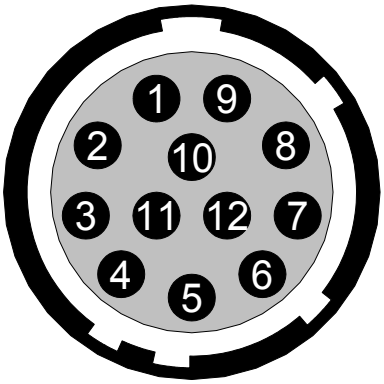
NOTE:

The external power supply has no user accessible parts. Refer maintenance to a qualified technician.

Video

The output video of the ***IR-1000*** is present at this 'BNC' connector. The signal is 1Vp-p terminated into 75Ω. Care should be taken to avoid no termination or double termination of the output video, which would result in incorrect video levels.

Camera



This 12-pin ‘Hirose’ connector supplies all of the power and interface to the camera head. There are no user level connections recommended into this connector. Contact Dage-MTI for optional cable lengths.

Pin-out of the ***CAMERA*** Connector is as follows:

PIN #	***FUNCTION***	***PIN #***	***FUNCTION***
1	***GND***	***7***	***Head Auto Gain***
2	***+12V to Head***	***8***	***Gate GND***
3	***Video GND***	***9***	***Gate In***
4	***Video from Head***	***10***	***N/C***
5	***N/C***	***11***	***N/C***
6	***Gain to Head***	***12***	***N/C***

Gate

This ‘BNC’ connector can be used to provide input of a gate pulse in order to increase the sensitivity by inhibiting the readout of the CCD's image and allowing light to gather in the CCD for extended periods of time before readout. Connect to a computer or the ***DAGE-MTI Investigater***. The ***CCD Gate*** input is compatible with standard CMOS type logic interfaces. (+5V=Readout; Gnd=Gate)

Specifications:

Pick-up Device:	1/2" Interline CCD w/microlens
Signal to Noise:	56db
Shading:	<5% overall
Sensitivity:	.05 fc (0.5 lux) @ 3200K
Minimum Illumination:	.00035 fc (.0035 lux)

	RS-170	**CCIR**
Active Picture Elements:	768(H) x 494(V)	752(H) x 582(V)
Picture Element Size:	8.4um(H) x 9.8um(V)	8.6um(H) x 8.3um(V)
Horizontal Resolution:	570 TVL	560 TVL
Effective Vertical Lines:	485 (2:1 interlace)	575 (2:1 interlace)
Pixel Clock Freq:	14.318 MHz.	14.1875 MHz.
Vertical Rate:	59.94 Hz.	50 Hz.
Horizontal Rate:	15,734 Hz.	15,625 Hz.

Weight:

Control Unit	1.48 lb. (0.67 Kg.)
Power Supply	0.75 lb. (0.34 Kg.)
Camera Head	0.25 lb. (.11 Kg.)

Size:

Control Unit	5½"(W) x 1½"(H) x 8"(L)
Power Supply	2½"(W) x 1¾"(H) x 4"(L)
Camera Head	1¾"(W) x $1^{1}/_{8}$"(H) x 3¾"(L)

Operating Temperature:	0°C to +40°C
Input Voltage:	95VAC to 250VAC

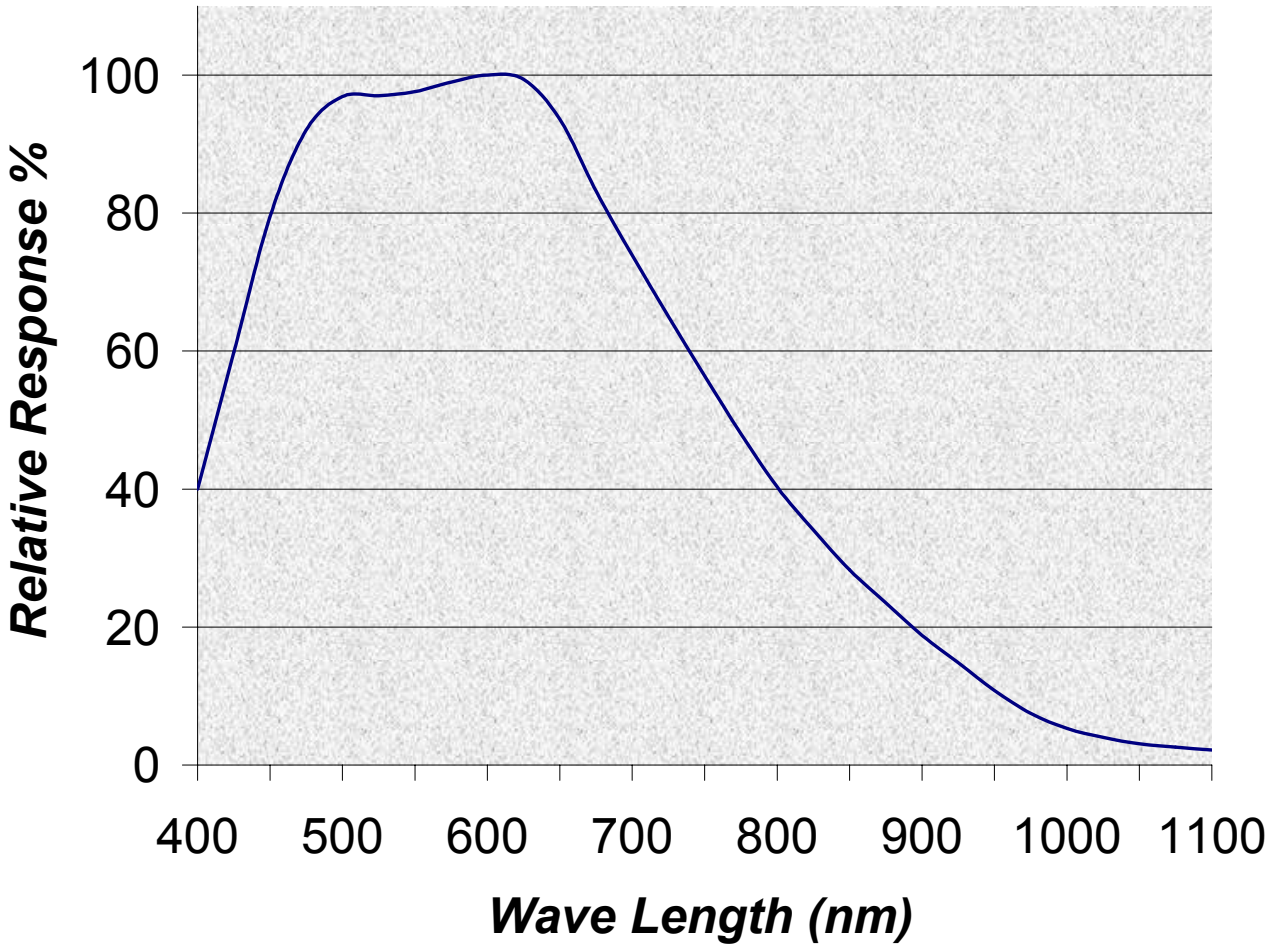


Figure 7: IR-1000 Spectral Sensitivity

Troubleshooting

No Picture (Check or try the following):

1. **Camera Power On?**
    a. External Power Supply Attached?
    b. AC Power On?
    c. LED on Control Unit On?
2. **Head Connected to Control?**
3. **Monitor Connected to Control Video Output?**
    a. Monitor Power On?
3. **Light Level Too Low?**
    a. Open Camera Lens.
    b. Set Gain Control into Auto.
    c. Rotate Black Level Control to Maximum.
    d. Set Head Shutter Control to Off.

Picture Saturated: (Check or try the following):

1. **Video Output Cable Terminated Into 75Ω?**
2. **Light Level Too High?**
    a. Reduce Lens Setting.
    b. Set Gain Control into Auto.
    c. Rotate Black Level Control towards Minimum.
    d. Use Shutter Control.

Warranty

The ***DAGE-MTI IR-1000*** is warranted to be free of defects in material and workmanship in normal use for a period of one year from the original date of purchase from *DAGE-MTI*.

This warranty does not apply to units which have been subject to abuse, neglect, accident, improper installation, or on which the serial number has been removed or damaged. Units that have been altered without the prior permission of *DAGE-MTI* are not covered by this warranty.

This warranty does not apply to other equipment furnished by *DAGE-MTI*, which is listed or otherwise identified as manufactured by another and therefore shall be covered by the other manufactures' applicable warranty.

Limitations

1. This warranty is valid only if the malfunctioning unit is returned to *DAGE-MTI* service depot. This warranty does not cover on-location service. If warranty work is needed, the following should be contacted:

DAGE-MTI, INC.
Customer Service
701 N. Roeske Ave.
Michigan City, IN 46360
(219) 872-5514
Fax: (219) 872-5559
service@dagemti.com

2. This warranty does not cover:
   a. Problems caused by or inflicted upon associated equipment such as digitizing systems, video tape recorders, cameras, microscopes, etc.
   b. Damage caused by accident, misuse, improper power source, fire, flood, lightning, other acts of God, war, and repair or alteration by other than a *DAGE-MTI* authorized service organization.
   c. Labor or incurred charges required in removing or installing the Product, down time, failure of the Product to perform properly, and any consequential damages.
   d. Transit damage.
3. Unit must be properly packaged (in original packing, if possible) when being returned under warranty.

DAGE-MTI Inc.
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Michigan City, IN 46360
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