

Model CF 1000

DC Regulated, Light Feedback Fiber Optic Lightsource 8 Position Filter Wheel Computer Controlled

- 8 Position Selectable Filter Wheel
- 150 Watt Tungsten Halogen Lamp
- Reliable Linear DC Regulation
- Proprietary *Light-Lock™* Closed Loop Light Feedback System
- Extremely Stable *Light* Output (0.1%)
- Remote Intensity, Power and Status
- RS-232 and RS-485 Interface
- Front Panel “*Lock Out*” (Operator Disable during Remote Operation)



CAUTION:

To reduce risk of electric shock, do not operate in wet or damp areas. Disconnect power before relamping or servicing.



WARNING:

To prevent risk of fire or burns, replace only with fuses and lamps listed on rear of unit. Let lamp cool before relamping.

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Safety Instructions

CAUTION:

- **Read all of these instructions before operating the unit.**
- **Follow all warnings and instructions on this piece of equipment**
- **Failure to use this equipment in the manner specified in this manual may cause the protection features of the unit to be impaired.**

1. **Retain Instructions** - All safety and operating instructions should be retained for future reference.
2. **Follow Instructions** - All operating and use instructions should be followed.
3. **Water and Moisture** - The unit should not be used near water, or in any area where excessive moisture may come in contact with the unit.

Eau Et Moisissure: Le système ne doit pas être utilisé près de l'eau, ou dans un environnement où la moisissure pourrait venir en contact avec le système.

4. **Mounting** - The unit should be mounted horizontally on a surface or platform, or vertically via fixture only as recommended by the manufacturer. **Never mount with fiber receptacle pointing down.**
5. **Ventilation** - The unit should be positioned such that its surroundings do not interfere with its proper ventilation. **Ensure that there is adequate air flow below (intake) and in the rear (exhaust) of the unit.**
6. **Heat** - The unit produces heat and infrared radiation. Do not place flammable materials on or near the unit at any time. Keep unit away from other sources of heat. The Lamp housing is marked with a HOT SURFACE CAUTION label to prevent accidental contact with it before it cools. Always allow time for the lamp and all surfaces surrounding the bulb to cool before attempting to replace lamp.



Chaleur: Le système développe de la chaleur et des radiations infrarouge. Ne pas placer de matériaux inflammables sur le système ou proche quelsoit le moment. Toujours prévoir du temps pour la lampe et les surfaces avoisinant la lampe pour refroidir avant d'essayer de remplacer la lampe.

7. **Polymer Fiber** - **To avoid permanent damage and failure to accessories that are constructed from polymer fiber a KG - 3 filter must be used with this lightsource. (it part number 9546)**
8. **Power Source** - The unit should be connected to a power source only of the type described in the operating instructions and as indicated by the power entry module.
9. **Grounding** - Precautions should be taken to ensure that proper grounding of the unit is assured.

10. **Power Cord** - Use only the approved power cord supplied with the unit, or an equivalent IEC 320 power cord with proper certifications. Power cord should be routed such that it will not be pinched, severed or walked on.
11. **Fuse** - DO NOT DEFEAT FUSE. Replace only with fuses as described in the operating manual and as marked on the unit for the operating voltage that the unit is set for.
12. **Safety Interrupt** - DO NOT MANUALLY DEFEAT THE SAFETY INTERRUPT SWITCH.

Interrupteur De Sécurité: NE JAMAIS DEFAIRE MANUELLEMENT L'INTERRUPTEUR DE SECURITE.

13. **Cleaning** - The unit should be externally cleaned using only standard glass type cleaners. Do not use solvents, cleansers or petroleum distillates. Disconnect power cord before performing any cleaning operations.
14. **Liquid and Object Entry** - Care should be taken to avoid objects falling into, or liquids being spilled into the enclosure through openings.
15. **Nonuse Periods** - Disconnect power cord from outlet when unit will be left unused for a long period.
16. **Damage Requiring Service** - The unit should be serviced by qualified service personnel if it exhibits any marked change in performance; if the power cord or enclosure has been damaged; or if objects or moisture have entered the unit.
17. **Servicing** - The user should not service the unit beyond that described in this manual. All other servicing should be referred to qualified service personnel. Disconnect power cord before performing any service on the unit.

18. **DB-15 Interface** -



The user should refer to the **Operations** section of this manual for a complete description of this connector and the function of each pin.

Description

The figure below reveals the main features for this unit. On the front panel there is a fiber optic receptacle with a retaining thumbscrew and a potentiometer. The intensity of the Tungsten Halogen lamp is adjusted via the potentiometer.

An IEC 320 power inlet module is located on the rear panel. This IEC320 module provides an internationally accepted power interface that can be used with a variety of power cords. The power entry module contains the main power switch, the voltage selector and the fuse box. The voltage selector card provides a convenient means to change the primary operating voltage to 100,120, 230 or 240 VAC. The selectable fuse holder allows the use of dual European fuses (5x20mm) or a single North American fuse, (1/4 x 1 1/4). In order to access the fuses the power cord must be removed.

The 15 pin "D" connector on the rear panel of the unit provides three types of remote interface control, remote analog, serial RS-232, or serial RS-485. The slide switches on the motherboard control the selection of the type of remote signal. Sliding the latch towards the rear of the unit opens the cover. This allows access to the slide switches and the lamp housing. Open the lamp housing cover by pulling up on the cover handle to access the lamp for replacement.

The unit can be permanently mounted by removing the feet. This can be done as long as adequate airflow below (intake) and in the rear (exhaust) of the unit is observed. Use M4 hardware and ensure a minimum of 10mm clearance under the base to allow for proper cooling. Never mount the receptacle pointing down.

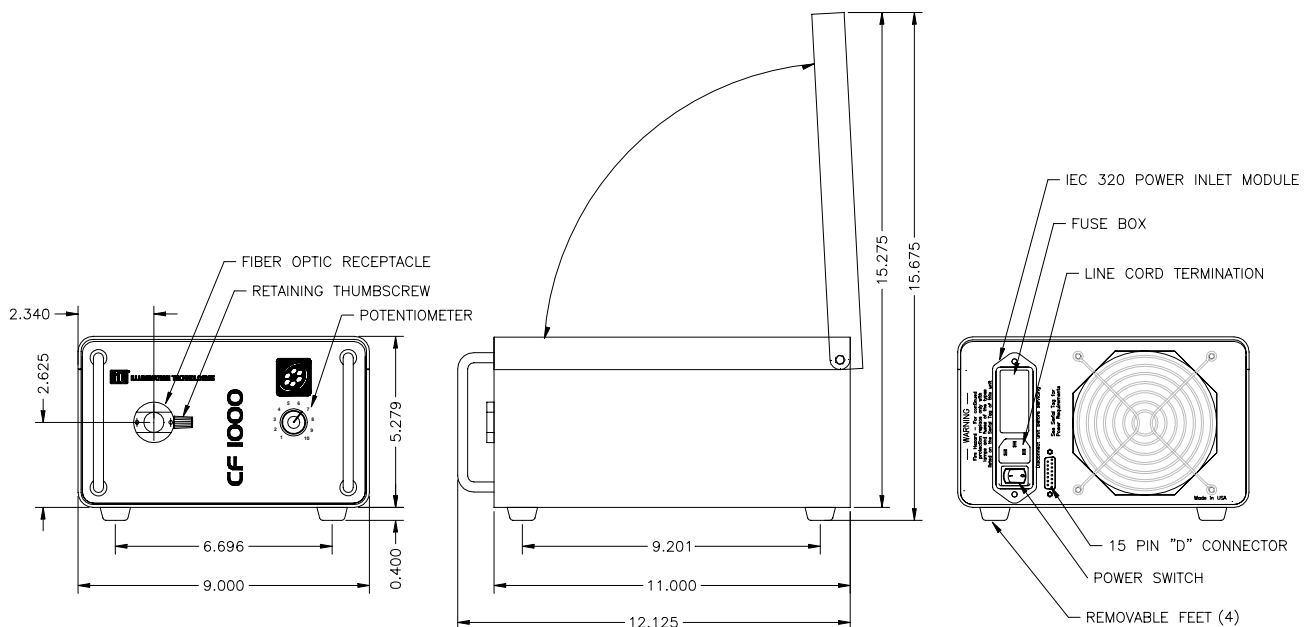


Fig 1 – CF1000 Lightsource

Power Supply

To change the fuses, start by removing the power cord. Insert a small flat blade screwdriver into one of the notches near the socket and twists to pop the door open. Pull the door straight out and swing it into the socket (see Figure 1). Lift the fuse holder out of the housing. Replace the fuses with T3.15 Amp, 5x20mm, size fuses. The fuses should be placed in the fuse holder as shown in Figure 2. Replace the holder in the housing fuses first. Swing the door closed and snap it back into place.

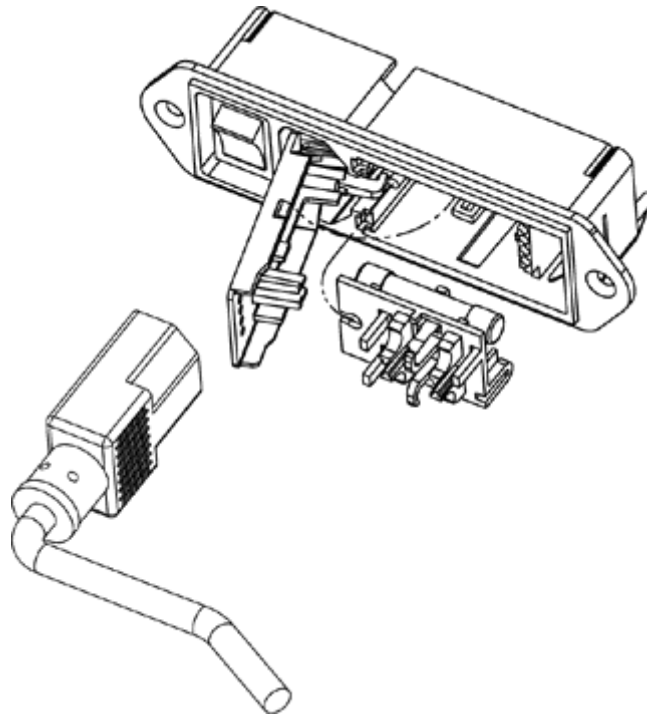


Fig 1 - IEC 320 Power Entry Module

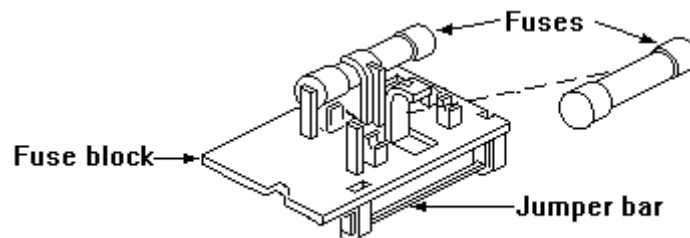


Fig 2 - Fuse Arrangement

Operations

General Description:

This product provides highly regulated, cool, white light at high intensities for injection into fiber optic lightguides. The CF1000 employs an IR interference type filter, which allows it to accept polymer fiber lightguides when used in conjunction with accessory filter P/N 9546. The unit has been tested by an independent laboratory and is certified to meet CE requirements. It is also has also been tested and meets the requirements of both UL3101-1 and CAN/CSA No. 101-1.

Functionally, the unit provides highly stabilized, white light from a 150 watt Tungsten Halogen lamp. Our exclusive **Light-Lock™** system ensures a highly stable light output for line voltage fluctuations in excess of $\pm 10\%$ of the nominal. An internal optical feedback sensor controls the long-term stability and repeatability of the lamp to better than $\pm 1\%$ throughout its' lifetime. A cold lamp draws 10 times the rated current during the first few milliseconds of operation. Our unit has "soft start" protection which eliminates initial in-rush current overshoot and increases the lamp life.

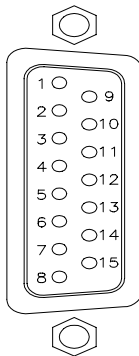
In addition to the front panel potentiometer, remote interfaces allow for independent control of the source via either analog signal (true, isolated, linear 0-5VDC interface), RS-232 or RS-485 serial communications. The light source intensity adjustment is linear with respect to all of these inputs.

A status indicator signal can be used to warn the operator of lamp failure, or any other condition that may render the unit out of regulation (LO signal means "All's Well"). This can be done by using the internal open collector circuit that is accessed through the D-15 interface.

The unit has a temperature sensor that prevents damage due to loss of proper cooling or ambient temperature above specification. The unit will have to be power cycled once the temperature sensor has been activated.

Operation:

Once the safety precautions are understood and committed to, one may proceed with familiarization of the unit and its operation. **"it"** fiber optic lightguides are inserted into the receptacle on the front of the unit and the thumbscrew locks the lightguides into place. Switch the power on using the switch on the IEC module. The lightsource is controlled via several different methods; the factory default is front panel mode. To run the unit remotely (analog or serial), configure a cable to mate with the appropriate pins on the unit's female D-15 connector as seen from the rear of the unit:



Pin 1: Open	Pin 9: Rx(-) (RS-485)
Pin 2: Ground	Pin 10: Rx(+) (RS-485)
Pin 3: Lamp Status (0 or 5VDC)	Pin 11: Tx(-) (RS-485)
Pin 4: Lamp Status Open Collector	Pin 12: Tx(+) (RS-485)
Pin 5: 5 VDC (Output)	Pin 13: Analog Input (LO)
Pin 6: TxD (RS-232)	Pin 14: Analog Input (HI)
Pin 7: RxD (RS-232)	Pin 15: Solid State Relay (5VDC activation)
Pin 8: Open	

Operations

The interface itself has provisions for controlling the light intensity, lamp power and an optional filter wheel. (These outputs can also be used for controlling other devices in custom applications.) It also has provisions for status indication including light intensity level, lamp status, relay status, and internal operating temperature. The unit can be set to run at 300, 1200, 9600 or 19200 BAUD using Dip Switches. See the Communications Protocol section for the protocols and motherboard configuration.

Lamp Status Indicator (Pin 3):

The lamp status indicator can be used to warn the operator of a lamp failure. A +5 VDC signal will be present on pin 3 with reference to pin 2 (DC Common) when the lamp has failed. During normal operation Zero VDC will be present when all is well.

Lamp Status Open Collector (Pin 4):

An external device connected to pin 4 is triggered by the lamp status when a lamp failure occurs. A path to DC common is provided when the lamp status indicates failure.

Solid State Relay (SSR):

The solid state relay is activated by applying +5 VDC to pin 15 with reference to pin 2 (DC common). Activation lowers the voltage across the lamp to a standby mode. This keeps the filament warm, preventing cold start instability. A low glow is visible to the operator.

Filter Changing:

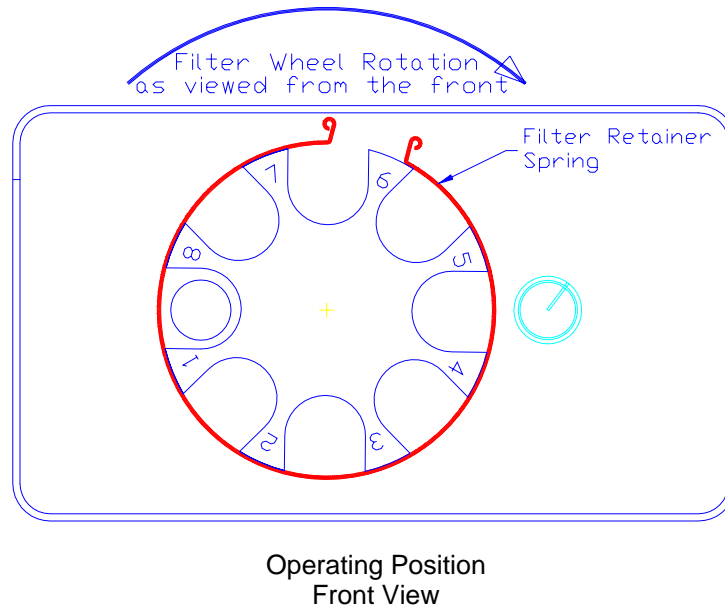
To change, replace or insert a new filter in the filter wheel assembly the position of filter number #1 or the "Home" position must be understood. Upon initial power up of the CF1000 Unit the built in microprocessor commands the filter wheel to seek "Home" position. This places the #1, filter holder slot directly between the lamp and the lightguide receptacle.

As you open the CF1000 Unit, the filter wheel has the positions marked. Facing the unit from the front, the filter slot at the top of the wheel when the wheel is in "Home" is actually slot #7. The filter wheel is designed to be rotated clockwise as faced from the front of the unit. Do not rotate the wheel counterclockwise as it may cause damage to the mechanism or cause the unit to go out of adjustment.

The retaining spring which holds the filters in their slots has a gap which allows for the removal or insertion of a filter by aligning this spring gap with the filter slot. This is accomplished by sliding the spring in a counter clockwise direction, while rotating the filter wheel in a clockwise direction, to the desired location. A filter then can be removed or inserted into the wheel. A pair of tweezers is provided and recommended for this task. To insure that the filter placed into a slot remains without falling out, the retainer spring should be slid over the filter with the spring gap located between filter slots.

NOTE: When the CF1000 cover is closed and/or the unit is powered up, Position #1, "Home", will be positioned just behind the lightguide receptacle. The Filter of choice can be positioned in the light path by selecting its position location #1 - #8.

Operations

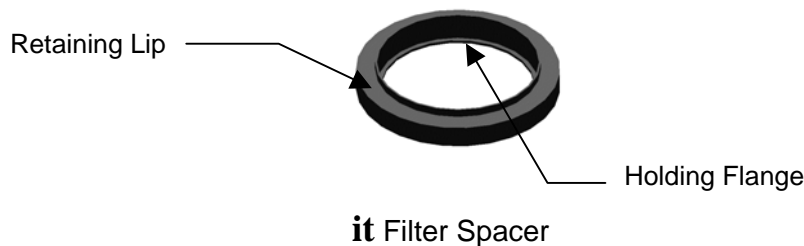


The standard **it** filter set contains 7 high efficiency interference type color filters. The filter wheel accepts any 25mm diameter filter that is 3mm thick and a variety of 20mm diameter filters. The **it** filter spacers accept 20mm diameter filters from 3 to 6mm thick. Any filter that meets the size requirement can be used, including neutral density, short wave, and long wave bandpass.

Filter Spacers:

Place the 20mm filter of choice into the filter spacer until it rests against the holding flange. Using a blunt metallic object such as the edge of a coin, fold a portion of the retaining lip toward the center of the spacer until that portion of the lip is parallel to the filter. Repeat this operation 4 or 5 times around the perimeter to secure the filter within the spacer.

NOTE: The coated surface of the filter can be placed either against the holding flange or on the retaining lip side. Maintaining uniformity of the filter placement within the Spacer and the Filter Wheel may effect consistency in the lighting application.



Filter size	it Spacer Part Number to Use
20mm Dia. By 3mm Thk.	954XCF
20mm Dia. By 4mm Thk.	954XCF-4
20mm Dia. By 5mm Thk.	954XCF-5
20mm Dia. By 6mm Thk.	954XCF-6

Communication Protocol

The standard communications interface supplied with this unit allows for remote computer control through either RS-232 or RS-485 serial communication. The interface itself has provisions for controlling the light intensity, the lamp power and the filter wheel. The unit also provides status indication including light level, lamp status, relay status, and internal operating temperature. The unit can be set to run at Baud rates of 300, 1200, 9600 (factory default) or 19200 using Dip Switches. (Directions for building RS-232 and RS-485 are available on our website.)

Communication Protocol: (IT 3900)

COM Port Settings

The COM port must be set to run with No Parity, 8 data bits, 1 stop bit. Flow Control should be set to Xon/Xoff in the Windows® environment. The port configuration command should read:

Baud Rate, N, 8, 1

The factory selected default baud rate for the interface is 9600 Baud Rate. To change this setting, see the section on BAUD RATE selection.

Switch Settings

The Mother Board has switches to control its operating configurations, the position of the switches are shown below.

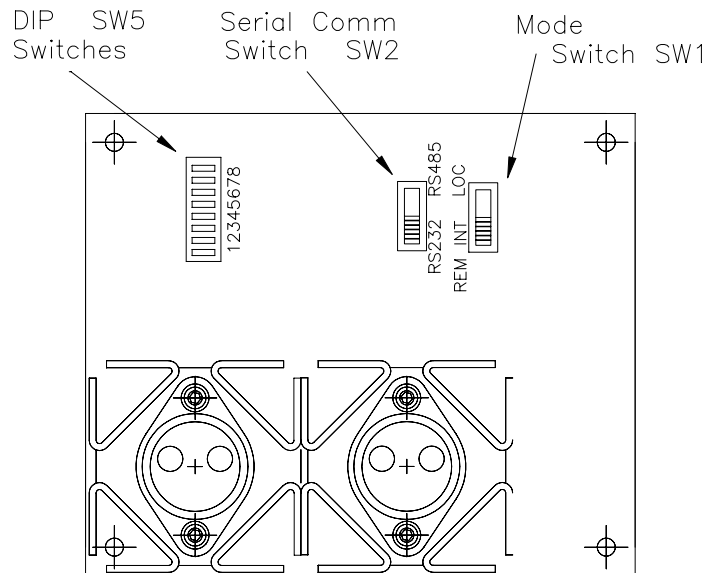


Fig 7 - 3900 Motherboard

To select between the three control modes, configure the switches according to the chart on the next page. This board is susceptible to damage from static discharge. **USE CAUTION TO PREVENT STATIC DISCHARGE** while changing switch selections.

Communication Protocol

Switch SW1 selects the mode of operation from the front panel potentiometer, a remote analog signal or serial communication. The switch SW2 selects the serial communication type between RS-232 and RS-485 modes. Dip Switch # 8 on SW5 must be set according to the type of serial communication selected.

Control Mode	Mode Switch (SW1)	Serial Switch (SW2)	Dip Switch #8 (SW5)
Front Panel Potentiometer	LOC	-	-
RS-232	INT	RS232	OFF
RS-485	INT	RS485	ON
Remote Analog (0-5VDC)	REM	-	-

The DIP Switch (SW5) allows the unit to be set for various **BAUD RATES** in RS232 mode, and it also sets the **ADDRESS** (for RS-485 mode). This DIP Switch (SW5) consists of 8 independent switches and is shown below:



Fig 8 - Dip Switch SW5

Switches 1 - 5 determine the address for the device for RS-485 configuration. Up to 32 sources can be operated from a single COM port.

The following chart describes the addressing scheme:

Address	1	2	3	4	5
0	ON	ON	ON	ON	ON
1	OFF	ON	ON	ON	ON
2	ON	OFF	ON	ON	ON
3	OFF	OFF	ON	ON	ON
.			.		
.			.		
.			.		
31	OFF	OFF	OFF	OFF	OFF

The controller address can be in the range of 0 to 31, however, each controller address must be unique, otherwise more than one controller will be trying to respond to commands, and data collisions will result. We also do not recommend the use of address 0 due to potential conflicts.

Communication Protocol

BAUD RATE

Switches 6-7 determine the Baud Rate according to the following:

<u>BAUD</u>	<u>6</u>	<u>7</u>	
300	OFF	OFF	
1200	ON	OFF	
9600	OFF	ON	* Factory Default
19200	ON	ON	

Switch 8 determines the serial communication mode according to the following:

<u>Serial Communication</u>	<u>8</u>	
RS-232	OFF	* Factory Default
RS-485	ON	

The **LightSet** software for Windows® 95, 98, or NT facilitates rapid and easy set-up and verification of communications. Contact factory or visit our website at www.illuminationtech.com for further information.

ASCII PROGRAMMING PROTOCOL

A) Definition of Terms

<ADDRESS>	ASCII "A" followed by two ASCII numbers from 0 to 31 (two characters for all addresses, RS-485 only)
<COMMAND>	ASCII characters as described below (3 character commands)
<ID>	ASCII character, either "=" or "?" (Control or Query)
<DATA>	ASCII number in the range of 0 to 255
<CR>	ASCII Carriage Return Character "\r"

B) Format

For ease of programming, and compatibility with almost all existing programs, the command Protocol for the serial interface is composed exclusively of ASCII characters, which can be typed from the keyboard. There are no spaces within any command string. All commands require the ASCII Carriage Return character "\r" as a terminator. There are two types of commands; a control command and a query command. The basic format for the RS-232 command strings are as follows:

Control Command:	<Command><ID><Data><CR> where <ID> is the ASCII character "="
Query Command:	<Command><ID><CR> where <ID> is the ASCII character "?"

Communication Protocol

The basic format for the RS-485 command string is very similar. The only difference is that the individual lightsource address precedes the <Command> as follows:

Control Command: <Address><Command><ID><Data><CR>
where <ID> is the ASCII character "="

Query Command: <Address><Command><ID><CR>
where <ID> is the ASCII character "?"

NOTE: The <Address> is always preceded by the ASCII "A" and must be two ASCII digits (i.e. "00" to "31") which match the address set by the DIP Switches within the lightsource to be controlled.

C) Query Commands

All successful queries will return data plus the ASCII Carriage Return character "␣" as a terminator.

Command:	"HEL" ID: "?" RS-232 Example: RS-485 Example: Response:	Hello Query the Source for Software Version Command = "HEL?␣" Command = "A03HEL?␣" (for source #3) "Ver. [Current]"
Command:	"LAM" ID: "?" RS-232 Example: RS-485 Example: Response:	Lamp Status Query the Source for Lamp Status Command = "LAM?␣" Command = "A03LAM?␣" (for source #3) "1␣" for All is Well "0␣" for Lamp Out
Command:	"SSR" ID: "?" RS-232 Example: RS-485 Example: Response:	Lamp Power Relay Query the Source for Relay Status Command = "SSR?␣" Command = "A03SSR?␣" (for source #3) "1␣" for Lamp Power ON "0␣" for Lamp Power OFF
Command:	"TEM" ID: "?" RS-232 Example: RS-485 Example: Response:	Internal Temperature Query Query the Source for Internal Temperature Command = "TEM?␣" Command = "A03TEM?␣" (for source #3) "32␣" Temperature in degrees Celsius
Command:	"FIL" ID: "?" RS-232 Example: RS-485 Example: Response:	Internal Filter Position Query the Source for Internal Filter Position Command = "FIL?␣" Command = "A03FIL?␣" (for source #3) "2␣" A value of 1-8 indicating the filter holder slot position in the path of the light beam

Communication Protocol

Command:	"DAC" ID: "?" RS-232 Example: RS-485 Example:	Lamp DAC Setting Query Source for current Lamp Setting (0-255) Command = "DAC?↵" Command = "A03DAC? ↵" (for source #3)
Response:		Returns ASCII character(s) from 0-255 which represents current Intensity setting plus the ASCII Carriage Return Character (↵)

D) Control Commands

All successful control commands will return the ASCII ">" plus the ASCII Carriage Return character "↵" as a terminator.

Command:	"DAC" ID: "=" DATA: NNN RS-232 Example: RS-485 Example: Response:	Lamp DAC Setting Set Lamp Intensity (0-255) ASCII character(s) from 0 to 255 Command = "DAC=47↵" Command = "A03DAC=47↵" (for source #3) ">↵" Sets Intensity DAC to 47 Intensity increases with increasing value (0-255)
----------	---	---

Note: The last value for "DAC" is stored IN EPROM. On subsequent restart this value will be used for the intensity setting.

Command:	"SSR" ID: "=" DATA: N RS-232 Example: RS-485 Example: Response:	Lamp Power Relay Control Turn Relay ON and OFF ASCII character, either "0" or "1" Command = "SSR=1↵" Command = "A03SSR=1↵" (for source #3) ">↵" Turns Power to Lamp ON
Command:	"HOM" ID: "=" RS-232 Example: RS-485 Example: Response:	Return Filter Wheel to Position #1 Turn Relay ON and OFF Command = "HOM=1↵" Command = "A03HOM=1↵" (for source #3) ">↵" Filter moves to position #1

SAMPLE PROGRAMS - QUICK BASIC (v4.5)

The following examples show how to execute both a control command and a query command.

The following line opens the COM port for 9600 Baud, No Parity, 8 Data Bits, 1 Stop Bit (cs,cd,ds set handshaking lines to 0)

OPEN "com2:9600,n,8,1,cs,cd,ds" FOR RANDOM AS #1

Communication Protocol

QUERY EXPAMPLES

Query uses the THREE ASCII CHARACTERS followed by the ASCII “?” followed by an ASCII carriage return. The response is ASCII data followed by a carriage return.

```
PRINT #1,"HEL?" + CHR$(13); 'HELLO  
INPUT #1, a$  
PRINT a$
```

```
PRINT #1,"DAC?" + CHR$(13); 'Query DAC value  
INPUT #1, a$  
PRINT a$
```

```
PRINT #1,"TEM?" + CHR$(13); 'Unit Temperature  
INPUT #1, a$  
PRINT a$
```

```
PRINT #1,"LAM?" + CHR$(13); 'LAMP STATUS  
INPUT #1, a$  
PRINT a$
```

```
PRINT #1,"SSR?" + CHR$(13); 'SSR STATUS  
INPUT #1, a$  
PRINT a$
```

UPDATE EXAMPLES

Update uses the three ASCII characters followed by the ASCII “=” followed by ASCII data 0-255 (depending on the command) followed by an ASCII carriage return. The response is a ‘>’ followed by a carriage return.

```
PRINT #1,"DAC=nnn" + CHR$(13); 'Set DAC to (nnn/255) * 5 Volts, nnn = 000 to 255  
INPUT #1, a$  
PRINT a$
```

```
PRINT #1,"SSR=000" + CHR$(13); 'Turn SSR OFF  
INPUT #1, a$  
PRINT a$
```

```
PRINT #1,"SSR=001" + CHR$(13); 'Turn SSR ON  
INPUT #1, a$  
PRINT a$
```

```
PRINT #1,"FIL=x" + CHR$(13); 'x =1 -8, Move filter wheel to position x  
INPUT #1, a$  
PRINT a$
```

```
PRINT #1,"HOM=1" + CHR$(13); 'Send Filter Wheel to Home Position  
INPUT #1, a$  
PRINT a$
```

Communication Protocol

SAMPLE PROGRAMS - VISUAL BASIC 5

The following examples show how to execute both a control command and a query command in Microsoft® Visual Basic 5 (These examples may not function properly with other versions of Visual Basic without some modification).

- 1) Start a New Form
- 2) Place a control onto the form called MSComm1
- 3) Place a textbox onto the form Text1
- 4) Dimension a variable called MyInputString as String

The following lines opens the COM port for 9600 Baud, No Parity, 8 Data Bits, 1 Stop Bit

This sets up the Comm port, place it in the form_load() procedure, or in a button_click() procedure, or where ever you want the Comport to be enabled. You can set this up in the properties for MSComm1 also.

```
MSComm1.Settings = "9600,n,8,1"  
MSComm1.CommPort = 1  
MSComm1.PortOpen = True
```

Note: The MSComm1.Input function reads all the characters available in the buffer at the time the instruction is executed. If all the characters have not yet arrived, then the input statement will only return the characters in the buffer. Subsequent inputs have to be made until all of the characters have been received. The following examples illustrate this procedure.

QUERY EXAMPLES

```
MSComm1.Output = "HEL?" + CHR(13) 'Hello  
MyInputString = MSComm1.Input  
Text1.text = MyInputString
```

```
MSComm1.Output = "DAC?" + CHR(13) 'Query DAC value  
MyInputString = MSComm1.Input  
Text1.text = MyInputString
```

```
MSComm1.Output = "TEM?" + CHR(13) 'Unit temperature  
MyInputString = MSComm1.Input  
Text1.text = MyInputString
```

```
MSComm1.Output = "LAM?" + CHR(13) 'Lamp Status  
MyInputString = MSComm1.Input  
Text1.text = MyInputString
```

```
MSComm1.Output = "SSR?" + CHR(13) 'SSR Status  
MyInputString = MSComm1.Input  
Text1.text = MyInputString
```

Communication Protocol

UPDATE EXAMPLES

```
MSComm1.Output = "DAC=nnn" + CHR(13) 'Set DAC to (nnn/255) * 5 Volts, nnn = 000 to 255  
MyInputString = MSComm1.Input  
Text1.text = MyInputString
```

```
MSComm1.Output = "SSR=0" + CHR(13) 'Turn SSR Off  
MyInputString = MSComm1.Input  
Text1.text = MyInputString
```

```
MSComm1.Output = "SSR=1" + CHR(13) 'Turn SSR On  
MyInputString = MSComm1.Input  
Text1.text = MyInputString
```

```
MSComm1.Output = "FIL=x" + CHR(13) 'x= 1 – 8, Move filter to position x  
MyInputString = MSComm1.Input  
Text1.text = MyInputString
```

```
MSComm1.Output = "HOM=1" + CHR(13) 'Send Filter Wheel to Home Position  
MyInputString = MSComm1.Input  
Text1.text = MyInputString
```

```
Public Sub IT_Comm_Demo()
```

```
Dim MyString as String  
Dim MyChar as Variant  
Dim Done as Boolean
```

```
MSComm1.Output = "HEL?" & Chr(13) 'Send out a Hello Command.
```

```
MSComm1.InputLen = 1 'Get only one character at a time  
MyString = ""  
MyChar = ""  
Done = False  
Do
```

```
MyChar = MSComm1.Input 'Get a character from the comport  
if MyChar = Chr(13) then 'If it is a terminating character  
Exit Do 'jump out of the loop  
else
```

```
MyString = MyString & MyChar 'otherwise concatenate it to the string  
endif
```

```
loop until Done 'Loop forever. Good programming  
techniques would suggest that a time out  
check be performed so as to not potentially  
lock up the program forever.
```

```
End Sub  
Program continues.
```

Specifications

Physical:

- Overall Dimensions

Height:	5.68" (145 mm)
Width:	9.00" (230 mm)
Length:	12.13" (310 mm)

- Weight/Mass (excluding power cable) 9.0 pounds (4.1 kilograms)

- Standard Cable Length: 8.0 feet (2.4 meters)

Electrical:

- Input Power: 88-132VAC/1.9A 50/60 Hz
176-264VAC/0.8A

- Short Term **Light** Stability: 0.1 % (RMS)
- Long Term **Light** Stability: < 1 %

- Power Consumption: 225 Watts (Nominal)
- Inrush Current @ 100/120 VAC: 3.6 A rms
- Inrush Current @ 230/240 VAC: 2.6 A rms
- Overvoltage Category: Category II

- Standard Lamp Type: EKE Type 150 W, 21V, MR-16 Style (Ushio Factory Recommended*)

Environmental:

- Operating Temperature Range: 0 to 40°C
- Relative Humidity Range: 0 to 95% non-condensing
- Altitude Rating: 2000 Meters Maximum
- Pollution Rating: Pollution Degree 2

Filter Capacity:

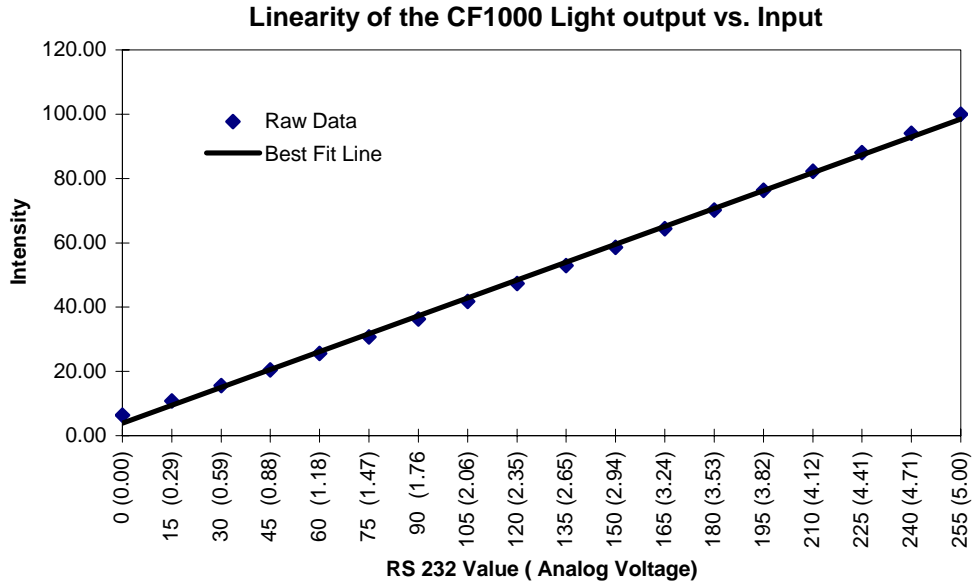
- 25 mm x 3mm optical filters: 8 positions
- 20 mm x 3mm optical filters: 8 positions**

*This unit comes with an Ushio Lamp use of other manufacturer's lamps requires calibration of the unit

**Requires the use of IT Part Number 954X Contact the factory for information

Output Linearity

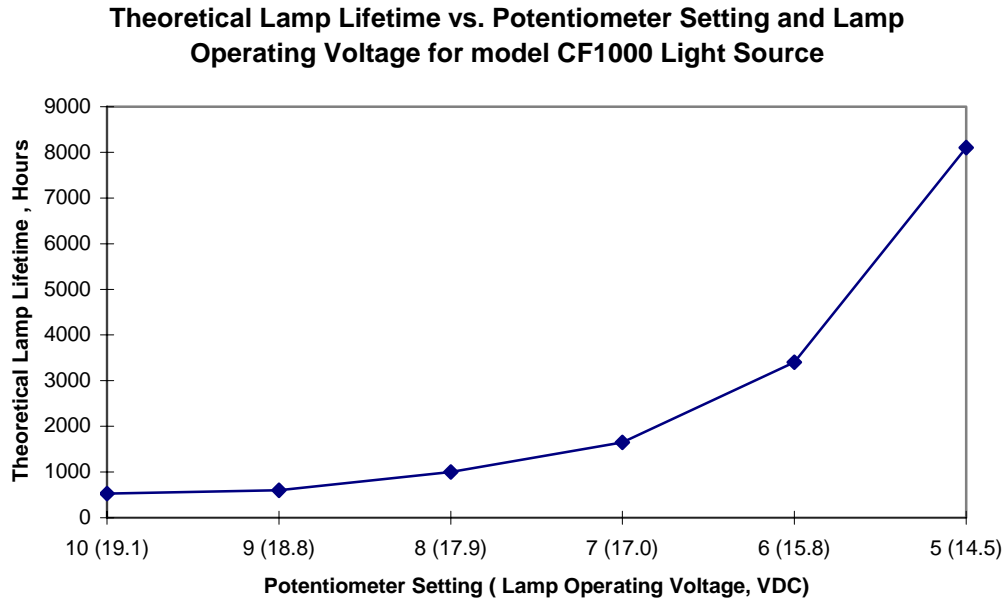
The CF1000 light intensity is linear with respect to the remote control signal. The change of the digital input, or corresponding analog (0 to 5VDC) signal, provides a linearly proportional change in the light output. Typical values are shown in the graph below.



<u>RS232</u>	<u>Analog Voltage</u>	<u>Lamp Voltage</u>
0	0.00	8.56
15	0.29	9.81
30	0.59	10.81
45	0.88	11.70
60	1.18	12.43
75	1.47	13.12
90	1.76	13.76
105	2.06	14.37
120	2.35	14.96
135	2.65	15.48
150	2.94	15.98
165	3.24	16.46
180	3.53	16.92
195	3.82	17.36
210	4.12	17.79
225	4.41	18.20
240	4.71	18.60
255	5.00	18.98

Lamp Life

The lamp life of all incandescent lamps is determined by the operating conditions*. The prime factor of lamp life is the voltage at which the lamp is operated. The lower the voltage the longer the projected life will be. The design of the CF1000 allows the optimizing of the life of the lamp by allowing the lamp voltage to be regulated to the desired intensity. The chart below illustrates the relationship of lamp life to operating voltage.



<u>Front Panel</u>	<u>RS232 Value</u>	<u>Lamp Voltage</u>	<u>Lamp Life (hrs)</u>
10	255	18.9	525
9	248	18.6	600
8	226	17.7	1000
7	205	16.8	1650
6	177	15.6	3400
5	146	14.3	8100
4	117	13.0	Note 2
3	81	11.5	Note 2
2	42	10.1	Note 2
1	0	8.3 ^{Note1}	Note 2

Note 1: The model CF1000 series lightsource is designed to assure the the Halogen lamp operates in the halogen cycle.

Note 2: The lamp life for these values will be similar to 14.5 VDC lamp voltage.

* Lamp Life and Linearity are functions of the lamp and vary between manufacturers. The data represented here is with respect to the factory recommended Ushio lamp, other lamps are not guaranteed to function within these specifications.

Maintenance

General:

This product has been designed, and tested to provide a lifetime of reliable performance. As with all electronic component assemblies, there is the possibility of failure. If for any reason the unit does not operate as outlined, follow the procedures below. If problems persist, refer to qualified service personnel.

Routine Maintenance:

The interior of the unit must be clean of dust and debris to ensure proper operation of the unit. Periodic cleaning of the unit using pressurized air to remove particles that have accumulated is strongly recommended. The hot mirror and the photosensor located on the lamp bracket should be cleaned with a glass cleaner to ensure the proper operation of the **Light-Lock™** technology. **If the environment that the unit is operating in is a severe industrial environment, please contact a factory representative or visit our website at www.illuminationtech.com for the information regarding our 3900 Rugged Lite™.**

Troubleshooting:

Basic troubleshooting of this unit is similar to the troubleshooting of any other electrical or electronic equipment. Check the most obvious possible cause(s) first. The following troubleshooting guide gives a description of possible solutions for a unit that is not operating.

If the unit does not produce the proper light level or the output is not stable.

Perform the routine maintenance that is outlined above. In many cases the **LIGHT- LOCK™** system is not functioning to specifications because the hot mirror on the lamp bracket is dirty.

If the fan is operating, but the lamp fails to operate, check the following in sequence:

Lamp - The primary reason for light failure is that the lamp has burned out. Allow the lamp and bracket cool before opening the lightsource cover. To change the lamp, disconnect the power cord from the unit. Open the cover by sliding the latch toward rear of the unit and lifting the cover up. The lamp housing is located in the front of the unit. Pull up on the cover tang to open. Next, pull up on the release lever that is located on the lamp bracket. Push lever back into the forward position and slide a new lamp into ceramic socket. Ensure that the lamp is seated into the base of the bracket. Close the lamp housing cover completely. **Using an incompatible lamp or failure to properly seat the lamp in bracket may cause erratic behavior or damage to the unit.**

Socket - If the unit still fails to operate, examine lamp socket for damaged or carbonized contacts, for a cracked ceramic base and frayed or damaged wiring. If any of these conditions are evident, consult the factory for replacement assembly. Do not attempt to repair this part for risk of fire and electric shock hazard.

Connector- Inspect the Molex connector from the lamp which is plugged into the PC board. Ensure that the male lamp connector is properly inserted into the board female.

Maintenance

OverTemp - This unit is equipped with an internal thermal cut-off mechanism. It will remove power to the lamp upon an over temperature situation. Ensure that there is adequate airflow below (intake) and in the rear (exhaust) of the unit. Once the cause of the over temperature condition is rectified the unit must be reset by turning the power off. **The unit will not operate until it has been reset.**

If neither the lamp nor the fan is operational, check the following items in sequence:

Power - Ensure that the power cord is inserted completely into the IEC connector on the back of the unit, and is connected to a power supply as specified on the rear panel. Check power cord for damaged or severed areas. Replace if defective.

Parts- Inspect the unit for burned or damaged components. Contact the factory if visible damage has been done to any of the components on the printed circuit board or any other components in the case.

Fuse - Remove power cord from IEC connector. Check fuse(s) using the procedure in this manual. Replace with spare fuse(s) as required. **REPLACE ONLY WITH FUSE TYPE DESCRIBED ON THE REAR PANEL OF THE UNIT.** If unit blows another fuse, consult factory for service.

Interlock - This unit is equipped with a safety interlock switch which prohibits operation unless the unit is fully closed. Make sure unit is completely closed and that the plunger is penetrating the interlock cover. **DO NOT DEFEAT THE INTERLOCK!**

If unit cannot be made operational using above procedures, call factory for servicing.

Spare Parts/Accessories

Spare Parts:

<u>Description</u>	<u>P/N</u>
EKE Lamp, 3200°K150 Watt, 21V	9582
EKE-HC Lamp, 4200°K150 Watt, 21V	9586 ¹
EKE-IR Lamp, 150Watt, 21 Volt	9588 ²
EKE-ER Lamp, 150 Watt, 21 Volt	9589 ³
Fuse, T 3.15 Amp, 5x20mm (pack of 10)	1010-205

¹ Must be used in a CF1000-HC lightsource only

² Must be used in a CF1000-IR lightsource only

³ Must be used in a CF1000-ER lightsource only

Accessories:

Quick Change Color Filters w/holders

<u>Color</u>	<u>Spectral Range</u>	<u>Part Number</u>
Red Filter	$\lambda > 610\text{nm}$	9541CF
Green Filter	$500\text{nm} < \lambda < 590\text{nm}$	9542CF
Orange Filter	$\lambda > 580\text{nm}$	9547CF
Yellow Filter	$\lambda > 520\text{nm}$	9543CF
Blue Filter	$\lambda < 510\text{nm}$	9544CF
Blue -Green Filter	$\lambda < 570\text{nm}$	9548CF
Day Light Filter	Color Balancing	9545CF
Color Filter Set	All 7 Filters Listed Above	9540CF
Customer Supplied	Filter Holder Blank - 20mm OD x 2,3mm Thick Filters	954xCF
	Filter Holder Blank - 20mm OD x 4mm Thick Filters	954XCF-4
	Filter Holder Blank - 20mm OD x 5mm Thick Filters	954XCF-5
	Filter Holder Blank - 20mm OD x 6mm Thick Filters	954XCF-6

Computer Setup Software And Cables

<u>Serial Interface Protocol</u>	<u>Total Cable Length</u>	<u>Part Number</u>
RS 232	6 ft.	2520
RS 485	8 ft.	2550

Warranty/Service

Warranty Statement:

The Illumination Technologies products are warranted to the original purchaser to be free from defect for one year from the date of purchase of the product. Illumination Technologies, Inc. will repair or replace, at its discretion, any defective unit within two (2) weeks of its receipt. This warranty is void if the unit in question has been visibly damaged by accident or misuse, if the unit has been serviced or modified by anyone other than an authorized representative of Illumination Technologies, Inc., or if any warranty seal has been broken. This is the only warranty expressed or implied by Illumination Technologies, Inc. Specifically excluded from this warranty is damage resulting from improper installation or neglect in the operation of the unit or misunderstanding of the properties of the unit.

Service Statement:

Any service required for any reason must be performed by Illumination Technologies, Inc. or an Illumination Technologies Authorized Service Representative. All service outside the warranty will be performed upon the purchaser's request according to normal service charges in affect at the time. To return any item, an RMA# (Return Materials Authorization) from Illumination Technologies must be obtained. This number must be affixed to the shipping label in plain sight. All shipping must be prepaid. Illumination Technologies, Inc. guarantees all repairs to be completed within two (2) weeks. All shipping charges will be the responsibility of the purchaser.

Liabilities:

Any warranty implied under State Law shall be limited to one year from original delivery to the original purchaser. Specifically excluded from Illumination Technologies, Inc. liability is damage resulting from acts of any deity, malicious mischief, vandalism, riots, wars, improper installation or neglect in the operation or maintenance of the unit or misunderstanding of the properties of the unit. Under no circumstances shall Illumination Technologies, Inc. be obligated for consequential or other damages of any kind or description, losses or expenses in connection with or by reason of the use of, or inability to use this unit for any reason. The stated warranty provides the purchaser with specific legal rights, and there may be additional rights which vary from state to state. Some states, for example, do not allow exclusion of consequential damage.