



Instruction Manual Infrared Strip Heater

Model 4185 StripIR

Publication No. 106991-001 Rev. 1

June 2010



Another quality product from:



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RESEARCH INC.
PROVIDING CONTROLLED ENERGY
DRYING ▲ CURING ▲ HEATING

Dear Customer,

Thank you for purchasing the Model 4185 StripIR™. We believe it is the finest system of its type and are confident you will think so too.

For technical assistance, training, replacement parts and assemblies, or any other problems or questions, contact our Field Service specialists. They will do everything they can to help you or will put you in touch with someone who can.

This instruction manual has been carefully prepared to ensure you get all the capabilities out of your system we designed and built into it. To tell us how we can make the system, our support of it, or this manual even more useful, we invite you to call our product manager with your suggestions and recommendations.

Additional copies of this manual are available at reasonable cost from our Customer Service Department.

Once again, let us welcome you to the growing family of Research, Inc. customers. We look forward to working with you in the future.

Sincerely,

Terry Nigon
President
Research, Inc.

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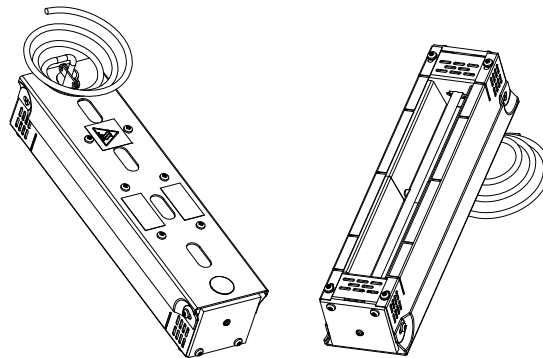
Introduction

The Model 4185 StripIR infrared heater is a lamp and formed reflector heating system that provides even heat distribution across a 1.7" wide strip. The Model 4185 heater uses T-3, halogen lamps backed by a ceramic reflector to provide heat and offer the users benefits of a high density heating solution.

The Model 4185 StripIR infrared heaters are designed for use in any application that requires a clean, responsive, non-contact heat source. Some typical applications for the heater are listed below:

- Curing epoxy
- Curing rubber coating on steel
- Drying and Curing Paint
- Drying and Curing adhesive
- Forming plastic
- Heating acrylic
- Laminating
- Preheating
- Reglossing
- Shrink Insulation
- Thermoforming
- Weld Stress Relief

Figure 1-1: Model 4185 StripIR Heater.



FEATURES AND BENEFITS

- The lamps of these heaters heat up and cool down instantly in response to power control signals.
- They reach 90 percent of full operating temperature within three seconds of a cold start.
- The radiant energy dissipates to ten percent five seconds after the power supply is disconnected.
- Localized heat focuses only on the desired area without heating the rest of the product.
- The construction of these heaters, combined with air-cooling, allows them to withstand continuous high temperature operation.
- Non-contact heat source does not come in contact with product being heated.
- The infrared energy emitted from these heaters can be adjusted to match the heating requirements of a variety of applications.
- Repeatable results can be achieved for consistent process outputs.
- Integrated power controllers to control the operation of the heater.
- The ceramic reflector in the heater module is self-cleaning in most applications. This feature provides both high efficiency and low maintenance cost.

HEATER DESCRIPTION

Heater Module

The absorption/emission characteristics of the ceramic reflector surfaces in the Model 4185 heater module maintain a high surface temperature. The reflector material also serves as a re-emitter of medium wave (3 to 4 microns) infrared energy. This can be beneficial in many processes depending on the absorptive properties of the material being heated.

Ceramic Reflector

The ceramic reflector provides heat by re-emitting medium wave and short-wave energy.

Mounting

The back of the Model 4185 has six 10-32 NF threaded holes for mounting purposes.

Product Temperatures

The maximum work-piece temperature depends upon a number of conditions: the ability of the work-piece to absorb radiant energy, the amount of heat loss, and the applied voltage to the heater emitter. For continuous heating processes, the maximum work-piece temperature should be less than 1300°F (704°C).

Heat Flux Densities

The Model 4185 can generate as much as 100 watts per linear inch (3.9 watts per mm). Dissipated power for the heaters varies with heated length and is listed in Specifications. Heat flux density is a product of the lamp type, applied voltage, and distance between the lamp and the target surface.

Product Sizes

A strip 1.7 inches in width and length from 5 to 38 inches (43 by 965 mm) can be heated with a single Model 4185. Mounting two or more heaters side-by-side can create different heated areas. For example, Figure 3 shows eight heaters installed cylindrically to provide high heat concentration on work-piece objects. Heating efficiency is highest on objects 1 inch or larger. Figure 4 shows three heaters installed to provide heat to a moving web of material. Additional heaters could be used in similar applications requiring greater heat flux density.

Figure 1-2: Cylindrical Heating

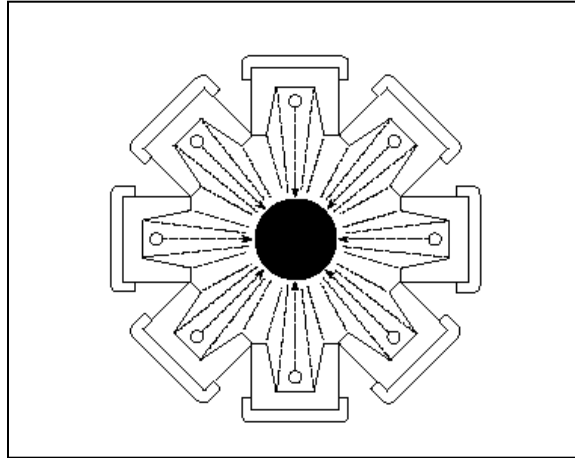
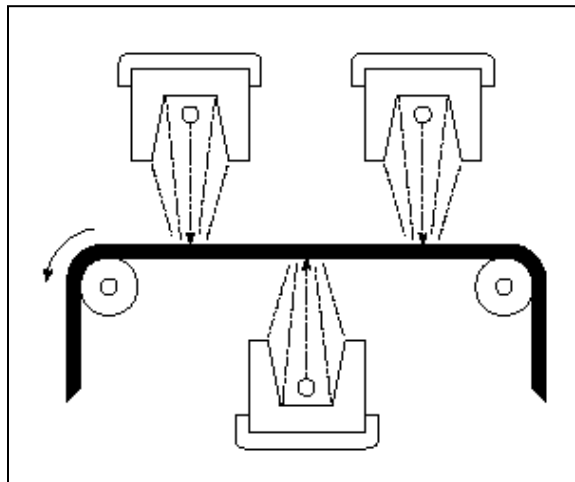


Figure 1-3: Web Drying



Lamps

The Model 4185 utilizes high intensity, short wave tungsten lamps. The tungsten emitter in the lamps has an operating temperature of up to 4000°F (2205°C) with a spectral energy peak wavelength of 1.15 microns. Each heater requires one lamp to operate. The Model 4185 will heat a strip that is 1.7 inch (43 mm) wide and is available in heated lengths of 5, 10, 16, 25 and 38 inches (127, 254, 406, 635 and 965 mm). Heated lengths should be at least 20% larger than work-piece.

Power Controller

The Model 4185 heater comes with the Research, Inc. Model 5420 SCR Power Controller. A separate instruction manual for the Power Controller is included with the heater.

Figure 1-4: Model 4185 with Power Controller



Safety

GENERAL

The Model 4185 Strip Heater is designed for safe operation. Nevertheless, installation, maintenance and operation of the heater can be dangerous for a careless operator or maintenance person. For your safety and the safety of others, please read the instructions in this INSTRUCTION MANUAL and follow these safety practices that will help to prevent accident or injury.

INFRARED RADIATION

CAUTION!

Continuous exposure to high intensity infrared radiation at close proximity could be harmful to eyes or skin. Although infrared lamps are not emitting ultra violet electromagnetic radiation, harmful burns could still result if an operator is in close contact with lamps being operated at high intensity.

Because of the brilliant light emitted by infrared lamps at full intensity, it is recommended that the eyes be shielded from the glare if observing the lamps or radiant heat chamber for an extended period of time. Use suitable shaded lenses or dark glasses.

HIGH TEMPERATURES

Parts of the heater may exceed 500°F (260°C). Contact with the lamps, reflectors, or metal parts near the lamps may cause severe BURNS.

WARNING!

NEVER place hands under the heating elements.

ALWAYS allow heating element to cool at least 5 minutes before touching the lamps or adjacent parts.

ELECTRICAL SAFETY

There is danger of electrical shock when servicing the heater.

CAUTION!

Observe that all applicable local and national electrical codes are met and a safe electrical ground system is installed before attempting to operate the heater. Refer to the Section 3 for proper installation procedures.

WARNING!

ALWAYS disconnect the external power lines prior to servicing the heater.

ALWAYS disconnect the power lines AND any optional interlock circuits before installing or changing lamps.

NEVER operate the heater with the heater end covers removed.

FIRE SAFETY

1. Obey the same fire-safety rules you observe when you work with hot plates, high intensity infrared heaters, propane or acetylene torches, soldering irons, and other equipment that gets very hot.
2. Remove all solids, liquids, and gases that burn easily from the area around the heater.
3. Know where the nearest fire extinguisher is located and how to use it.
4. Know how to put out fires from all the types of material near the Model 4185 Heater.

Assembly

UNPACK AND CHECK FOR DAMAGE

Remove the Model 4185 heater from its shipping container and associated packaging. Check the entire unit for any potential damage due to shipping. In the unlikely event damage has occurred, keep all shipping containers and materials and file a damage claim with the shipping company that delivered the heater.

REQUIRED TOOLS

- Phillips Screwdriver
- Pliers
- Wire Stripper

REFLECTOR AND LAMP INSTALLATION

NOTE:

The Reflectors and Lamp are shipped separately and must be installed prior to operation. Refer to Figures 3-1 Reflector and Lamp Assembly operations.

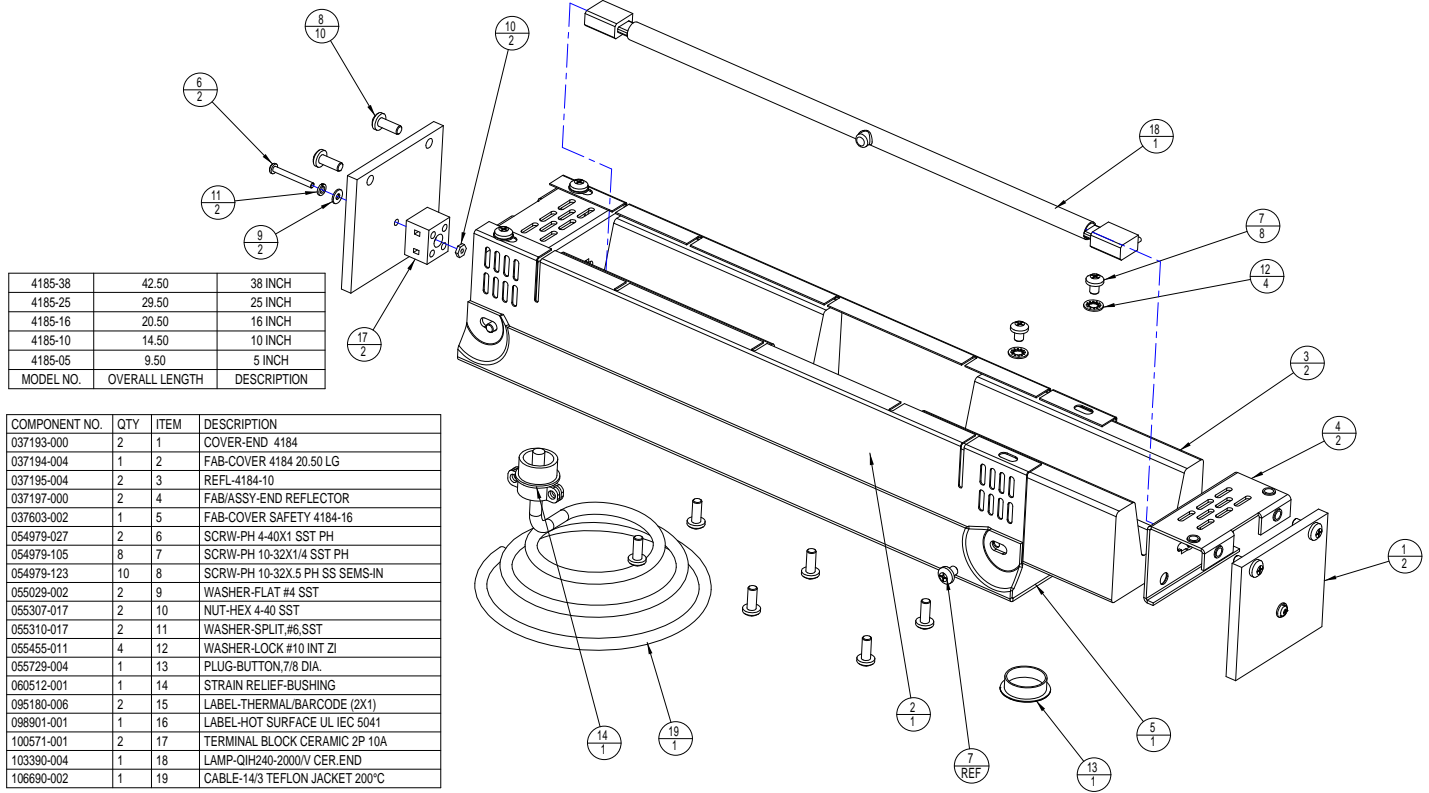
1. Remove both Ceramic End Covers, item 1, from both End Reflector assemblies, item 4.
2. Remove End Reflector assemblies, item 4, from Heater Housing, item 2, on the end opposite Power Cord, item 19.
3. Slide Reflectors, item 3 into Heater Housing, item 2.
4. Reassemble End Reflector, item 4.

CAUTION!

Wear soft, clean, oil-free flannel or plastic gloves when handling halogen, quartz lamps. Oils and contaminants are readily transmitted to the quartz by unprotected hands and can cause premature lamp failure.

5. From the end of the assembly insert the Lamp, item 18, through the End Reflector openings
6. Trim approximately 4" off each Lamp Lead then strip .25" of insulation off each Lamp Lead.
7. Insert Lamp Lead into Terminal Blocks, item 17, to make connections to power wiring. Repeat at other end.
8. Reassemble End Covers, item 1.

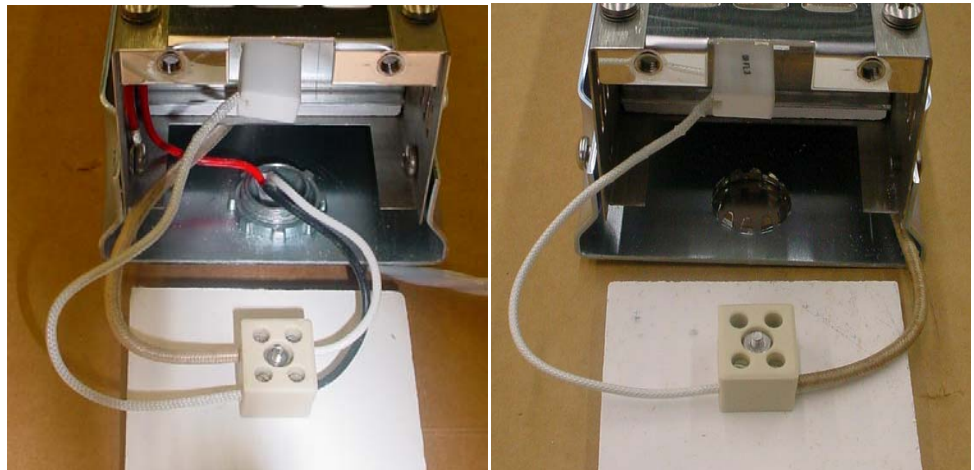
Figure 3-1: Reflector and Lamp Assembly



MODEL NO.	OVERALL LENGTH	DESCRIPTION
4185-38	42.50	38 INCH
4185-25	29.50	25 INCH
4185-16	20.50	16 INCH
4185-10	14.50	10 INCH
4185-05	9.50	5 INCH

COMPONENT NO.	QTY	ITEM	DESCRIPTION
037193-000	2	1	COVER-END 4184
037194-004	1	2	FAB-COVER 4184 20.50 LG
037195-004	2	3	REFL-4184-10
037197-000	2	4	FAB/ASSY-END REFLECTOR
037603-002	1	5	FAB-COVER SAFETY 4184-16
054979-027	2	6	SCRW-PH 4-40X1 SST PH
054979-105	8	7	SCRW-PH 10-32X1/4 SST PH
054979-123	10	8	SCRW-PH 10-32X.5 PH SS SEMS-IN
055029-002	2	9	WASHER-FLAT #4 SST
055307-017	2	10	NUT-HEX 4-40 SST
055310-017	2	11	WASHER-SPLIT.#6,SST
055455-011	4	12	WASHER-LOCK #10 INT ZI
055729-004	1	13	PLUG-BUTTON,7/8 DIA.
060512-001	1	14	STRAIN RELIEF-BUSHING
095180-006	2	15	LABEL-THERMAL/BARCODE (2X1)
098901-001	1	16	LABEL-HOT SURFACE UL IEC 5041
100571-001	2	17	TERMINAL BLOCK CERAMIC 2P 10A
103390-004	1	18	LAMP-QIH240-2000/V CER.END
106690-002	1	19	CABLE-14/3 TEFLON JACKET 200°C

*** DENOTES PART NUMBERS LISTED ARE FOR MODEL 4185-10. CONSULT FACTORY FOR PART NUMBER CORRESPONDING TO YOUR MODEL.



Installation

TOOLS REQUIRED

- Phillips Screwdriver

MECHANICAL INSTALLATION

NOTE:

Refer to Figures 4-1 Typical Installation.

Refer to Figure 4-2 Mounting Dimensions.

As shown in Figure 4-1, six 10-32 x 1/2 inch screws are provided on the top of the Model 4185 heater for mounting purposes. The heater can be attached directly to a suitable frame structure or mounting brackets using these six screws. Mount the heater so that the intended target absorbs the generated infrared energy yet not so close that the heater touches the target. The heater should be mounted so that each end cover may easily be removed for lamp installation.

Multiple Model 4185 heaters can be mounted side-by-side to form large heating arrays.

**Figure 4-1: Typical
Installation for Model 4185
Heater**

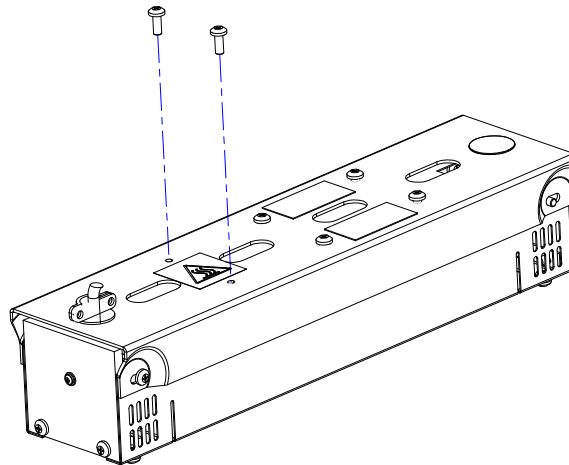
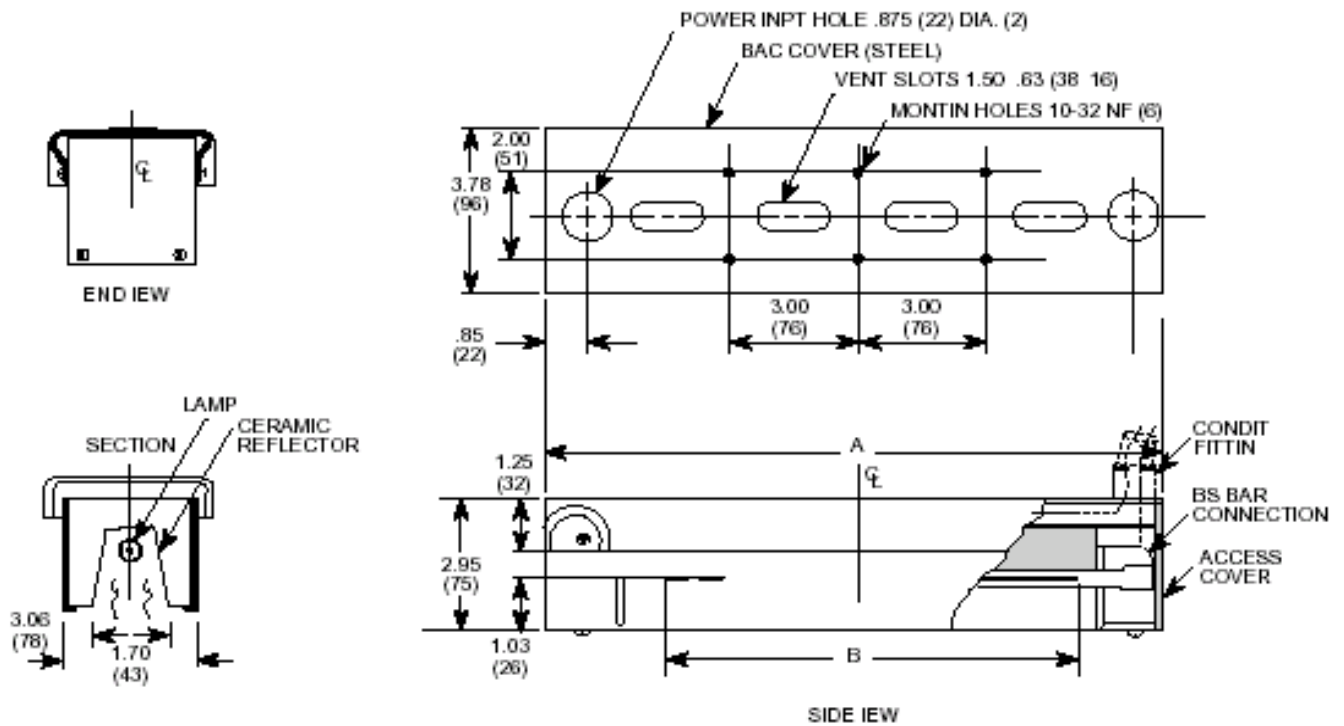


Figure 4-2: Mounting
Dimensions for Model 4185
Heater

DIMENSIONS STRIP IR 4185					
Dimension	4185-05	4185-10	4185-16	4185-25	4185-38
A Overall Length Inches (mm)	9.5 (241)	14.5 (368)	20.5 (521)	29.5 (749)	42.5 (1080)
B Lighted Length Inches (mm)	5 (127)	10 (254)	16 (406)	25 (635)	38 (965)



**WIRING POWER
TO HEATER**

All electrical wiring from the Model 4185 to the Model 5420 SCR Power Controller is included on Model 4185 units. Refer to Model 5420 SCR Power Controller Instruction Manual for further wiring details.

Maintenance

GENERAL

Periodic inspection and removal of dirt and contaminants will ensure that equipment can be operated safely.

LAMP AND REFLECTOR SURFACE MAINTENANCE

In dirty environments or heating operations the lamps may become contaminated with smoke, dust, fingerprints or other foreign matter. When this occurs it is recommended that the lamp be cleaned. Doing so will extend the life of the lamp and improve the heater's overall performance. Use the following procedure:

WARNING!

Disconnect the power cable from the power source and allow the heater to cool before continuing.

CAUTION!

Wear soft, clean, oil-free flannel or plastic gloves when handling quartz lamps. If skin oils come in contact with the quartz tube, the lamp will fail prematurely.

1. With a soft, dry cloth or tissue, wipe the residue from the lamps. Household strength ammonia can be used to clean the lamps if necessary.

The ceramic reflector is a high temperature material with unlimited life and is essentially self-cleaning.

CAUTION!

Wear soft, clean, oil-free flannel or plastic gloves when handling quartz lamps. If skin oils come in contact with the quartz tube, the lamp will fail prematurely.

LAMP REPLACEMENT

1. Remove both end covers from the Model 4185 by removing the two screws from each end cover using the Phillips screwdriver.
2. Disconnect lamp leads from terminal blocks.
3. Grasp lamp end and pull the lamp out of heater.
4. Feed one end of the new lamp (wire first) into the lamp slot in end reflector, through the heater, and into the lamp slot on the heater's opposite end.
5. Connect lamp leads to terminal blocks.
6. Reinstall both end covers, insert all four end cover screws, and 'hand tighten' each screw using the Phillips screwdriver.

Product Information

Specification

MODEL SPECIFICATIONS 4185						
Specifications	4185-05	4185-10		4185-16	4185-25	4185-38
Weight lb (kg)	2.0 (0.91)	3.3 (2.6)		5.4 (2.6)	8.4 (3.8)	12.8 (5.8)
Rated Voltage	120 Volt	240 Volt		240 Volt	480 Volt	480 Volt
Power at Rated voltage	0.5 KW	1.0 KW	1.0 KW	1.6 KW	2.5	3.8
Lamp	103390-001	097771-001	103390-003	103390-005	103390-007	103390-010
Optical	Clear	EZ eye	Clear	Clear	Clear	Clear
Part to Order	4185-05-500	4185-10-1000E	4185-10-1000	4185-16-1600	4185-25-2500	4185-38-3800

Ordering Information

MODEL 4185

	Product Description - 5 inch Strip heaters (500 watt)
4185-05-500-01-00	4185-05 with Model 5420-120 controller (includes potentiometer)
4185-05-500-02-00	4185-05 with Model 5420E-120 controller (includes potentiometer and timer)
4185-05-500-03-00	4185-05 with Model 5420mA-120 controller (includes 4-10 mA input control)
	Product Description - 10 inch Strip heaters with EZ eye lamp (1000 watt)
4185-10-1000E-01-00	4185-10 with Model 5420-120 controller (includes potentiometer)
4185-10-1000E-02-00	4185-10 with Model 5420E-120 controller (includes potentiometer and timer)
4185-10-1000E-03-00	4185-10 with Model 5420mA-120 controller (includes 4-10 mA input control)
	Product Description - 10 inch Strip heaters (1000 watt)
4185-10-1000-01-00	4185-10 with Model 5420-240 controller (includes potentiometer)
4185-10-1000-02-00	4185-10 with Model 5420E-240 controller (includes potentiometer and timer)
4185-10-1000-03-00	4185-10 with Model 5420mA-240 controller (includes 4-10 mA input control)
	Product Description - 16 inch Strip heaters (1600 watt)
4185-16-1600-01-00	4185-16 with Model 5420-240 controller (includes potentiometer)
4185-16-1600-02-00	4185-16 with Model 5420E-240 controller (includes potentiometer and timer)
4185-16-1600-03-00	4185-16 with Model 5420mA-240 controller (includes 4-10 mA input control)
	Product Description - 25 inch Strip heater with EZ Eye lamps (2500 watt)
4185-25-2500E-01-00	4185-25 with Model 5420-240 controller (includes potentiometer)
4185-25-2500E-02-00	4185-25 with Model 5420E-240 controller (includes potentiometer and timer)
4185-25-2500E-03-00	4185-25 with Model 5420mA-240 controller (includes 4-10 mA input control)
	Product Description - 25 inch Strip heaters (2500 watt)
4185-25-2500-01-00	4185-25 with Model 5420-480 controller (includes potentiometer)
4185-25-2500-02-00	4185-25 with Model 5420E-480 controller (includes potentiometer and timer)
4184-25-2500-03-00	4185-25 with Model 5420mA-480 controller (includes 4-10 mA input control)
	Product Description - 38 inch Strip heaters (3800watt)
4185-38-3800-01-00	4185-38 with Model 5420-480 controller (includes potentiometer)
4185-38-3800-02-00	4185-38 with Model 5420E-480 controller (includes potentiometer and timer)
4185-38-3800-03-00	4185-38 with Model 5420mA-480 controller (includes 4-10 mA input control)

Accessories/Replacement Parts

MODEL 4185

MODEL 4185	
	Replacement Lamps (all lamps sold in pairs)
103390-001	5 inch, 500 watt.
103390-003	10 inch, 1000 watt
103390-005	16 inch, 1600 watt
103390-007	25 inch 2500 watt
103390-010	38 inch, 3800 watt
	Replacement Reflectors
037195-003	05 inch length (1 per heater)
037195-008	10 inch length (1 per heater)
037195-003,-008	16 inch length (1 each per heater)
037195-007,-008	25 inch length (Qty. 1 -007 and Qty. 2 -008 per heater)
037195-003,-008	38 inch length (Qty. 1 -003 and Qty. 3 -008 per heater)
	Heater Modules
4185-05-500	4184-05-500 Heater Module
4185-10-1000	4185-10-1000 Heater Module
4185-16-1600	4185-16-1600 Heater Module
4185-25-2500	4185-25-2500 Heater Module
4185-38-3800	4185-38-3800 Heater Module
	120 volt Power Controllers
5420-120	Model 5420-120 Power Controller
5420E-120	Model 5420E-120 Power Controller
5420mA-120	Model 5420mA-Power Controller
	240 Volt Power Controllers
5420-240	Model 5420-240 Power Controllers
5420E-240	Model 5420E-240 Power Controllers
5420mA-240	Model 5420mA-240 Power Controllers
	480 Power Controllers
5420-480	Model 5420-480 Power Controllers
5420E-480	Model 5420E-480 Power Controllers
5420mA-480	Model 5420mA-480 Power Controllers

Accessories/Replacement Parts continued
4184/4185 Ceramic Reflectors Replacement Part Numbers

Heater Size	Old Reflector Part #	Length	Qty.	New Reflector Part #	Length	Qty.
5	037195-003	6.0"	1	037195-003	6.00"	1
10	037195-004	5.5"	2	037195-008	11.0"	1
16	037195-001	5.66"	3	037195-008	11.0"	1
				037195-003	6.0"	1
25	037195-002	6.5"	4	037195-008	11.0"	2
				037195-007	4.0"	1
38	037195-002	6.5"	6	037195-008	11.0"	3
				037195-003	6.0"	1