

Model 6040 User's Manual

Dry-IR

Infrared Dryers

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Another quality product from:



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Dry-IR
MODEL 6040-16
USER'S MANUAL

107103-002 REV. 1

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Dear Valued Customer:

Thank you for purchasing a Model 6040 Dry-IR infrared dryer. We believe it is the finest heating system of its type and are confident you will think so also.

This instruction manual has been carefully prepared to ensure you will be able to easily install and operate the Model 6040 dryer and to fully realize all its inherent capabilities. We invite your comments as well as any issues you may have regarding this manual or the Model 6040.

Requirement

Appropriate Contact

Additional information regarding application of the Model 6040 dryer or other Research Inc. products.

Your local sales representative.

Ordering additional Research Inc. products or Manuals.

Your local sales representative or Research, Inc. Customer Service
(952) 949-9009

Technical assistance and training.

Research Inc. Factory Service
(952) 949-9009

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 Niogon
President
Research Inc.

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Section 1 - Introduction

The Model 6040 *Dry-IR* Drying System is specifically designed to dry ink-jet printing. On many types of coated stock, the water or solvent base of the ink is not easily absorbed by the material. Instead, it remains on the surface in a liquid state and is easily smeared if touched. The *Dry-IR* heater module provides the heat and air flow necessary to convert the liquid to vapor, and quickly remove it from the surface of the paper. When used in conjunction with an ink-jet printer, the *Dry-IR* Drying System can increase printing production by as much as 85 percent.

Features

Heater Module

The heater module supplied with the system features four tubular quartz lamps, an aluminum reflector behind the lamps, side reflectors and forced air cooling. The quartz lamps have low mass tungsten filaments allowing them to reach full operating temperature within two- to three seconds after being turned on. The hot air comes out of the holes in the aluminum reflector and passes between the lamps directly on to the material being dried.

The system is available with one or two heater modules which will dry ink-jet printing that is up to 4-inches (102 mm) wide for a single unit and up to 8-inches (204mm) wide for 2 units. The heater module is available in a 10 inch (254 mm) heated length.

Refer to Appendix A for heater module dimensions.

Power Control

The power control for the heater module is located on the top of the heater body. A process controller controls heat output. The heat can be adjusted manually by using the buttons on the process controller or with a closed loop circuit. The process controller will accept a 0-10 vdc, 4-20 ma or thermocouple input. A switch on top of the housing is provided to turn the system on and off.

An interlock is also provided that enables the heater module to be connected to the transport. This interlock must be satisfied for the heater module to operate.

Mounting Brackets

The optional mounting base consists of vertical and horizontal supports attached to a roll around base, brackets for the heater module and all hardware needed for mounting. Screw holes are located on the ends of the case for mounting to other types of supports. See Appendix A for mounting locations.

Section 2 – Safety

General

The Model 6040 *Dry-IR* Drying System is designed for safe operation. Nevertheless, installation, maintenance and operation of the system 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, which 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 ultra violet electromagnetic radiation is not being emitted by infrared lamps, 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.

Electrical Safety

There is danger of electrical shock when servicing the heater module or any item contained in the blower housing. Even when the ON/OFF switch is in the OFF position, there is live HIGH VOLTAGE (up to 240V) present at the power entry of the switch. The power cord is the main disconnect for the heater.

WARNING!

- DANGER OF ELECTRICAL SHOCK.
- ALWAYS disconnect the power cord AND any optional interlock circuits before moving, servicing, installing or replacing lamps.
- NEVER operate the heater with the control box cover open or with the heater front cover removed. This panel is designed to protect the operator from electrical shock.
- Even if the Power Switch of the control unit is in the Off position, there is live High Voltage present at the power entry of the Power Switch, AND at the interlock circuit when the conveyor is running.
- A position sensing switch will turn the lamps OFF when the mounting arm is raised, but HIGH VOLTAGE is still present inside the control box.

Note: All service should be performed by qualified Service personnel.

Fire Safety

CAUTION!

- Jams or stoppages in the transport may cause a FIRE HAZARD.
- NEVER operate the system unless an operator is present at all times.
- NEVER operate the system without a FIRE EXTINGUISHER in the immediate area.
- REMOVE all paper from under heater module IMMEDIATELY if the transport stops or jams. Even though the lamps are turned off, RESIDUAL HEAT may still ignite paper.

High Temperatures

WARNING!

- Parts of the heater may exceed 500°F (260°C). Contact with the lamps, aluminum reflectors, or metal parts near the lamps may cause severe BURNS.
- NEVER place hands under the heating elements when it is operating or hot.
- ALWAYS allow heating element to cool at least 15 minutes before touching the lamps or adjacent parts.
- ALWAYS wear soft, clean, oil-free flannel or plastic gloves when handling quartz lamps.

Labels

CAUTION – INTERNATIONAL

Position

This label is installed on the front side of the housing.



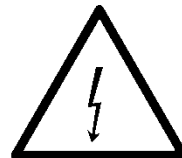
Identification

The CAUTION label is a yellow label indicating a potentially hazardous situation that could result in injury. The international “exclamation point” legend is used on the 6040 to indicate that caution is required when operating or servicing the product due to high temperatures and high voltage.

HIGH VOLTAGE WARNING – INTERNATIONAL

Position

This label is installed on the removable front panel of the housing. Removing this panel allows access to the power and control circuits within the housing.



Identification

The HIGH VOLTAGE label is a yellow label indicating a potentially hazardous situation that could result in injury. The international “lightning bolt” symbol is used on the 6040 to indicate that high voltage is present inside the enclosure. All power cords to the product must be disconnected before servicing the product or replacing the lamps. Power is present inside the housing when the unit is tilted up, even when the position sensing circuit shuts off the lamps.

CAUTION HOT SURFACE – INTERNATIONAL

Position

This label is installed on the heater side panels near the surface of the lamps and reflector.



Identification

The HOT SURFACE label is a yellow label indicating a potentially hazardous situation that could result in injury. The international “hot surface” symbol is used on the Model 6040 to indicate that high temperatures are present on the lamps and reflector. Allow a minimum of 15 minutes of cool down time for the lamps and reflector before servicing the unit, replacing lamps, or relocating the unit.

Section 3 - Installation

CAUTION!

- Please read the installation instructions carefully. It is important that the Model 6040 is installed correctly or important safety features will not be operational.

Tools Required

1. Phillips screwdriver
2. Straight blade screwdriver

Mechanical Installation

There are 4 - 5mm (10-32) mounting holes on each end of the heater for mounting the unit. See Appendix A for dimensions.

Installing Lamps

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.

When installing lamps in the heater module it is important to avoid touching the quartz glass lamp tubes. Fingerprints and dirt marks on the tube will absorb more heat and may shorten lamp life. If a lamp does get touched or dirty, clean it with a soft tissue or cloth before using the system.

CAUTION!

- Before installing or changing lamps, disconnect all power cords to the system.

To install or change the lamps:

1. With a Phillips screwdriver, remove the screws that fasten the front cover of the heater module. Remove cover.
2. Loosen the 4 screws that hold the reflector in place and slide the air deflectors off.
3. Insert the lamp lead wires through the reflector and snap the lamp into the spring clips provided (Figure 3-1). If the lamp clips are excessively tight, gently spread the clip wider. Make sure that the lamp is held securely in the clip.

CAUTION!

- It is important that the lead between the lamp and barrier strip not be pulled tight when the lamp is installed. As the heater module and lamps heat and cool, they are also expanding and contracting which may damage the lamp if the lead is too tight.

4. Insert the lamp lead wire into terminal blocks 1TB1-4 and 2TB1-4 and tighten the screw terminal. Make sure that the terminal block is not tightened on the insulation of the wire.
5. When all of the lamps have been installed, check for electrical shorts to the heater's metal chassis and then replace the air deflectors and front cover.

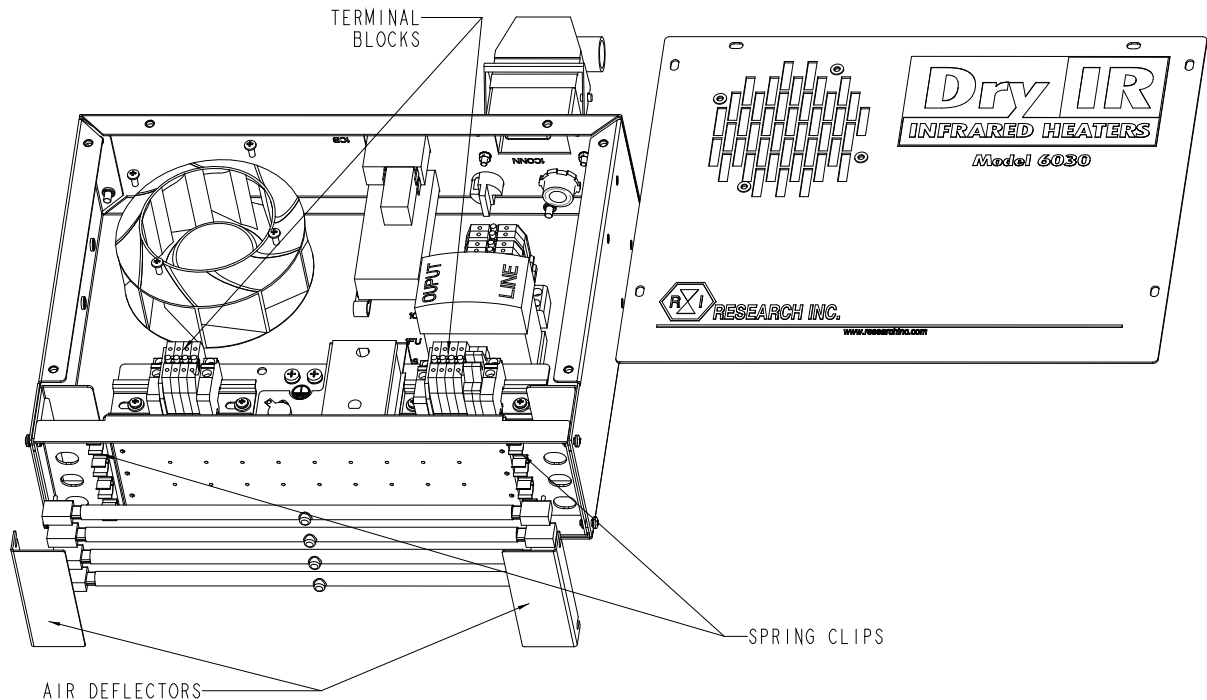


Figure 3-1. Model 6040 Spring Clip and Terminal Block locations.

Electrical Installation

Connecting the Power Source

The *Dry-IR* Drying System must be connected to a dedicated 240V, 30-amp electrical circuit. Secure the power cord and interlock circuit cable to the mounting arm with the supplied nylon cable tie to keep it from being positioned under the heater module.

CAUTION!

- The heater module requires a dedicated power circuit.

Making the Interlock Connections

The purpose of the interlock line is to prevent the heater module from operating if the transport is not running. This helps minimize the risk of fires if paper is under the heater module when the transport comes to a halt. The Model 6040 may be ordered with a 24VAC relay, a 24VDC relay, or a 120VAC relay installed.

Note: The Model 6040 will not operate unless a transport signal is supplied to the interlock circuit.

Typically, an interlock cable is supplied from the transport and is connected on top of the blower housing, near the ON/OFF switch.

WARNING!

- **Disconnect the power to the heater module before proceeding.**

To connect the interlock to the transport:

1. Remove the gray connector from the top of the unit.
2. The white insert can be removed from the housing by loosening the 4 screws that secure it into the housing.
3. Route the wiring through the wiring gland in the housing.
4. The interlock wiring is connected to pins 1 and 4. To prevent the heater module from running when the transport is stopped, the transport interlock power source needs to be off when the transport is stopped.
5. Reassemble the connector and tighten the wiring gland.

Note: After completely installing the Model 6040, please ensure the stability of the overall assembly.

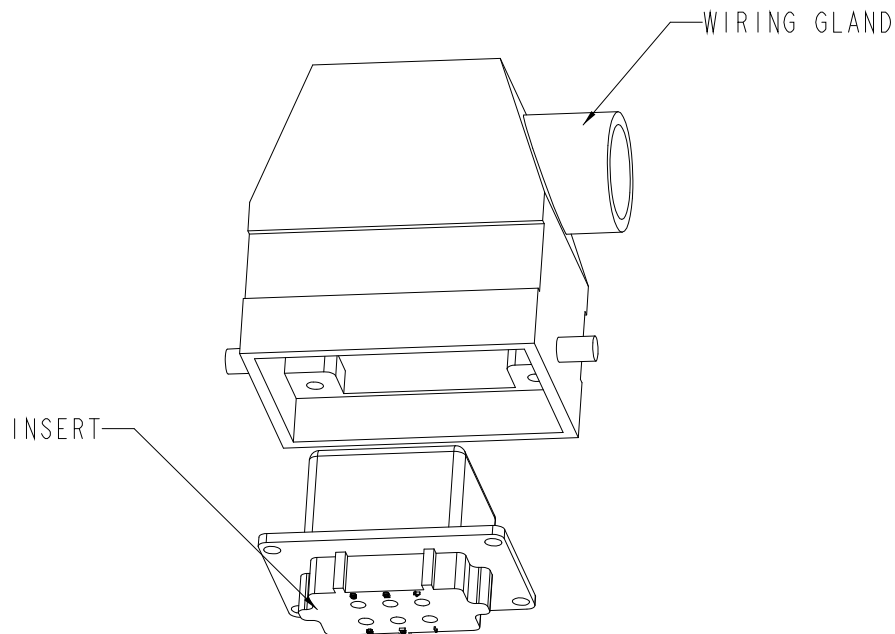


Figure 3-2

Section 4 - Operation Instructions

Note: The lamps in the heater module will respond very quickly when turned on, but the most effective drying results will occur after the heater module has been on for about 45 to 60 seconds. This allows the heater module enough time to start producing hot air.

Once the Dry-IR Drying System has been properly installed, it is very easy to operate. When used with an interlock to the transport, it will operate only when the transport is running.

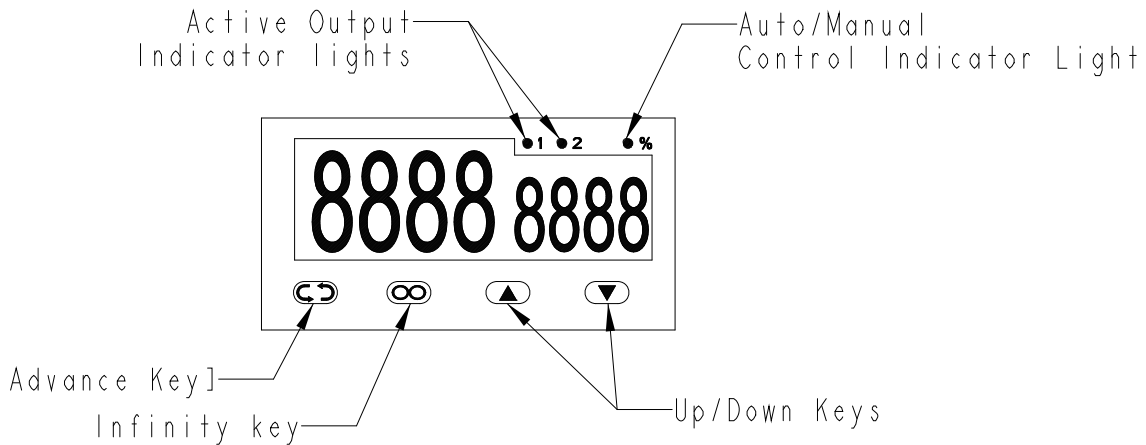
ON/OFF Switch

Turning the ON/OFF switch to ON will apply power to the heater module and blower.

Note: The heater module must be in the drying position, the interlock circuit must be energized to allow the on/off switch to apply power to heater module.

Process Controller

The keys on the face of the unit operate the process controller. Additional information on operating the controller can be found in the Watlow users Manual.



Manual Mode (Open Loop Control)

Manual mode on the process controller is indicated by the % indicator being lit. The Auto/Manual mode can be toggled by pressing the advance key until A-M appears in the right (green) window and pressing the up/down keys to toggle control.

Auto Mode (Closed Loop Control)

The process controller comes with default settings for 0-10 vdc (user set 1) and a type K thermocouple (user set 2). The controller allows a large variety of inputs that can be used to control the process. If you are using something other than a 0-10 vdc or type K thermocouple input as the process control, see the Watlow users manual for details on how to set up the controller for different types of input. Use the following procedure to configure the controller for the default settings:

1. Press and hold the Up/down keys for 6 secs until FACt PAgE appears on the display.
2. Use the Advance key to scroll through the displays until USrr appears in the right (green) display.
3. Use the up/down keys to change the user default set. Set 1 is for 0-10 vdc and Set 2 is for type K thermocouple. Allow the left display (red) to automatically change from the chosen set to no. This will take about 10 secs.
4. Use the infinity key to return to the home page.

User Set 1 (0-10 vdc) Displays and Settings

The infinity key can be used at any time to return to the home page. The home page in this mode will display the actual input signal in volts in the left (red) display, and the output in percent in the left (green) display. Use the Advance button to change the display. Pressing the advance key once will change the display to a screen to change the auto/manual mode. The up/down keys can be used to toggle the auto/manual mode. Pressing the advance key again will allow the user to change the voltage at which full output is achieved. If the process signal is a 0-5 vdc signal, change this value to 5.

User Set 2 (Type K Thermocouple) Displays and Settings

The home screen with this user set will show the process variable in the left (red) screen and the set point in the right (green) screen. Use the up/down keys to change the set point. Use the advance key to scroll through the following screens:

Left (Red) Display	Right (Green) Display	Description
0.0	PoHt	Output %
Auto	A-M	Auto/Manual mode
Off	Aut	Auto tune feature (see Watlow manual)
0	Cal	Offset value for set point
PID	hEM	Control method
25.00	Pbht	Heat Gain (proportional)
0.0	rEht	Heat Reset (integral)
0.0	rAht	Heat Rate (dirivative)
F	F-C	Scale

Section 5 – Maintenance

In dusty environments the lamps and impeller blades should be inspected occasionally for a cloudy buildup. When this occurs it is recommended that they be cleaned. Doing so will extend the life of the lamp and improve the system's overall performance. Use the following procedure:

WARNING!

- **Disconnect all power cords from the power sources and allow the heater to cool at least 15 minutes 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.

If a lamp burns out or breaks, refer to Appendix B, Replacement Parts, for ordering information and to Section 3, Installing Lamps, for lamp replacement instructions.

2. Remove dust build-up on the impeller blades using compressed air.

Note: All service should be performed by qualified Service personnel.

Troubleshooting

PROBLEM	SOLUTION
Lamps do not come on	Make sure the fan is spinning. Check that the supply voltage is 240 VAC.
	Check the Interlock connection. Power must be applied to the interlock before the lamps will turn on. Make sure that the proper relay is installed.
	Make sure that the heater is in the heating position.
	Check the tach signal. The tach signal should be 0-10 VDC, 0 is lamps off 10 V is maximum power. Set the heater to manual mode. If the lamps come on, check the signal from the tachometer. Try switching the wires on the tach.
	If the unit is controlled by a thermocouple, disconnect the thermocouple. This will switch the controller to manual mode. Increase the manual output and see if the lamps come on.
	Check that CR1 has power and is energized. Check that the correct relay has been installed.
	Circuit breaker does not stay on.
Check the supply voltage is 240 VAC.	
Check the thermostat to see if it is working properly and that the unit is not overheating.	
Only some of the lamps come on.	Check for burned out lamps.
	Make sure that the lamp leads have a good connection to the terminal blocks. Make sure that the terminal blocks are not clamped on the lead wire insulation.
Fan does not rotate.	The fan should come on as soon as the breaker is turned on. If the breaker does not trip out, power is being applied to the system. Check the fan wiring and connector and check the incoming power.. Replace fan if required.
Lamps do not turn off.	The lamp control relay is getting a faulty signal. Check the wiring connections to the control module. Replace the module if necessary.
	The solid-state relay has failed. Replace the control module.

Appendix A

Dimensions and Specifications

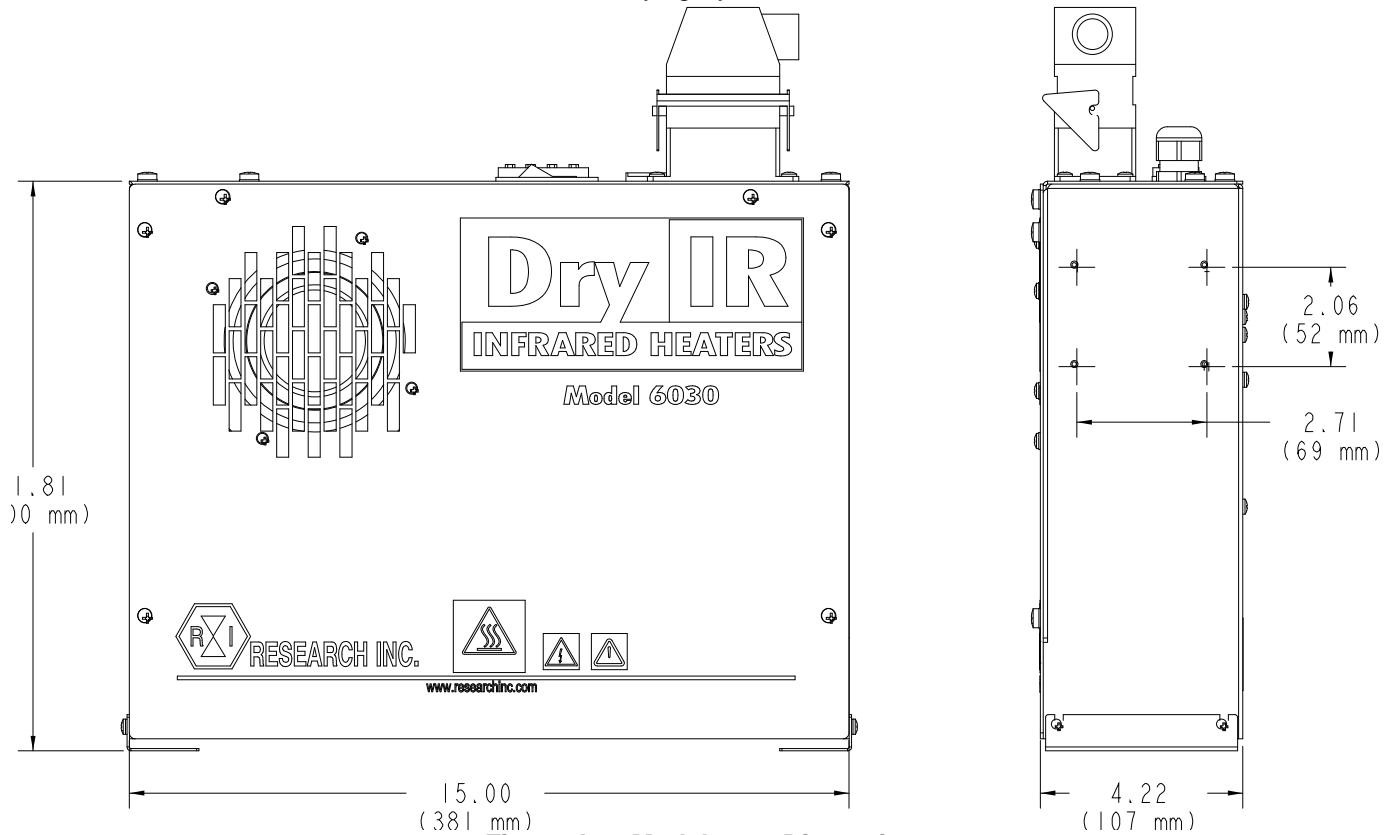


Figure A-1. Model 6040 Dimensions.

Maximum Drying Width	4 inches (102 mm)
Overall Length	15 inches (381 mm)
Heated Length	10 inches (254mm)
Lamps (4 Total)	1000W-Rapido-COLL-14OAL
Lamp Rated Voltage	240 volts
Applied Lamp Voltage	240 volts
Amps at Applied Voltage	18.0 amps
KW at Applied Voltage	4.0 KW
Blower Air Volume	75 CFM (2.1m³/min)
Interlock Relays	120 VAC, 24 VAC, 24VDC
Mounting Hardware	Extruded Aluminum
Operator Controls	On/Off switch
	Heat Adjustment
	Automatic Heat Adjustment via Tachometer Input Circuitry and External Tachometer Kit (Tachometer Kit Option – ordered separately from Drying System)
Operation Interrupts	When the interlock connections are made, the heater module will not function unless the transport is running
Site Requirements	240VAC/30 amp 1ϕ service dedicated circuit.
	Personnel to position the system in place
	An electrician to install a 240VAC/30 amp IEC power cord, and connect the wiring between the power control and the transport.

Table A-1. Model 6040 Dry-IR Specifications.

Appendix B

Spare & Replacement Parts

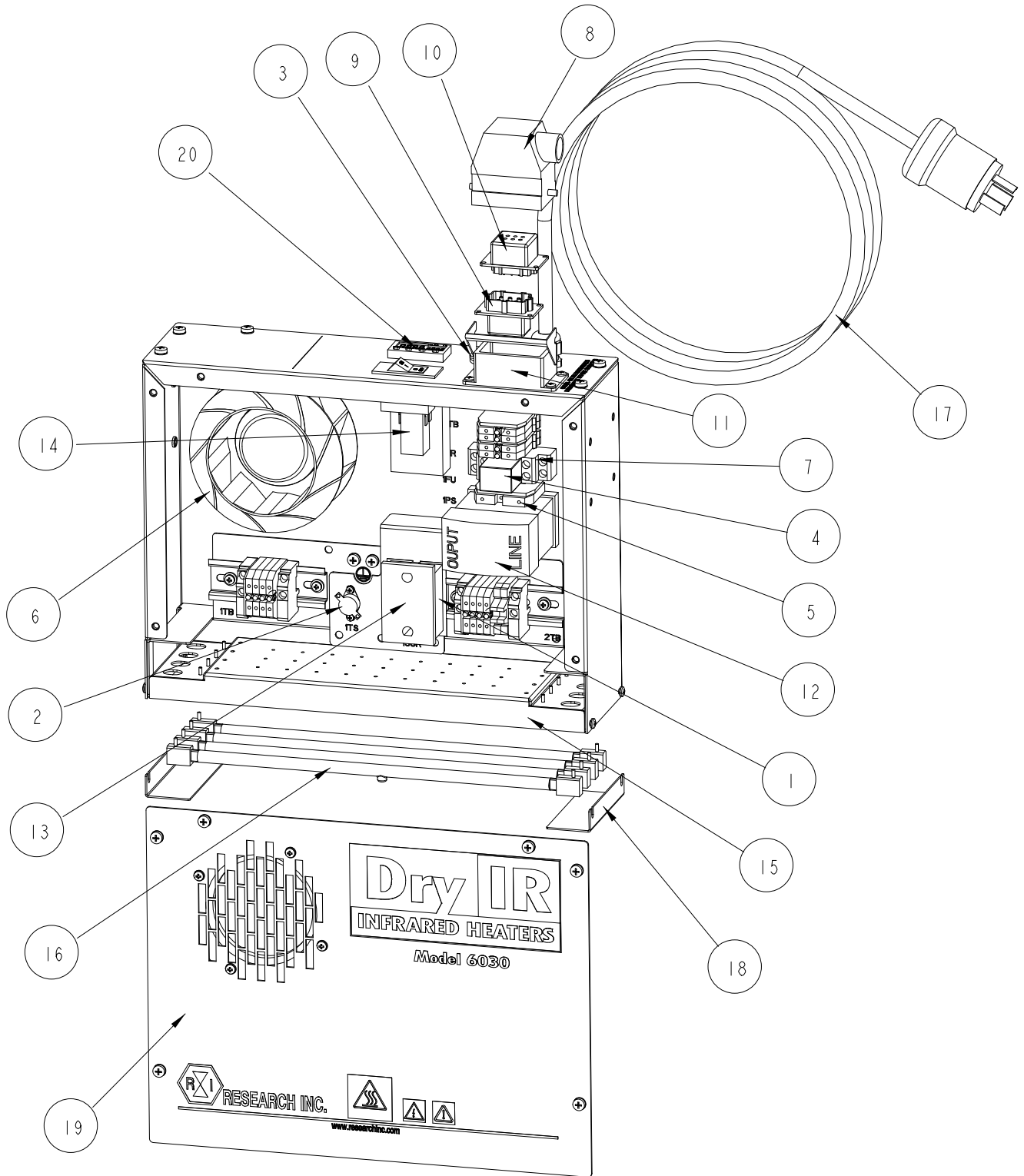


Figure B-1. Model 6040 Spare & Replacement Parts.

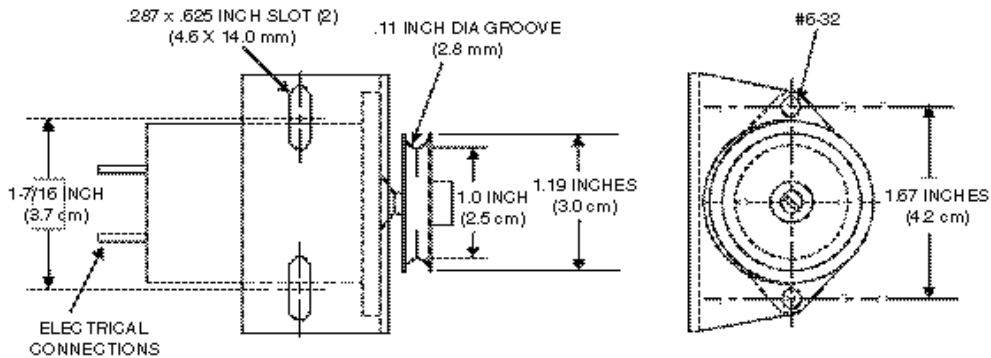
Appendix C

Installing the Optional Tachometer Kit

The dryer may be mounted on a variety of equipment configurations. If the tachometer supplied with the *Dry-IR* system is used (Fig. C-1), it must be properly installed so that it will send a “speed signal” to the control box ranging from zero volts when the conveyor is stopped to 10 volts when the conveyor is at full speed. Doing so will enable the controller to operate properly, and provide the widest range of heat control.

When a dual module system is ordered, the tachometer cable included has one end that connects to the tachometer, and one connection to go into each of the drying modules.

The tachometer furnished with the *Dry-IR* system is a D.C. generator that creates a 5-volt output when rotating at about 650 rpm. Getting the tachometer to rotate at 650 rpm when the conveyor is at full speed requires that the correct size shaft or roller drive the O-Ring drive belt. The following two sections explain how to determine the correctly sized driving shaft depending on the type of equipment on which the dryer will be mounted.



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Figure C-1. Tachometer and Mounting Bracket

When the potentiometer is adjusted and used in conjunction with the tachometer kit, the potentiometer to output relationship remains the same as when run without the tachometer - the potentiometer trim maximum output and tachometer are directly proportional to line speed. The line speed dictates the dryer output, and the potentiometer further limits dryer output by controlling the voltage applied to the dryer.

Appendix D

Schematic Drawings