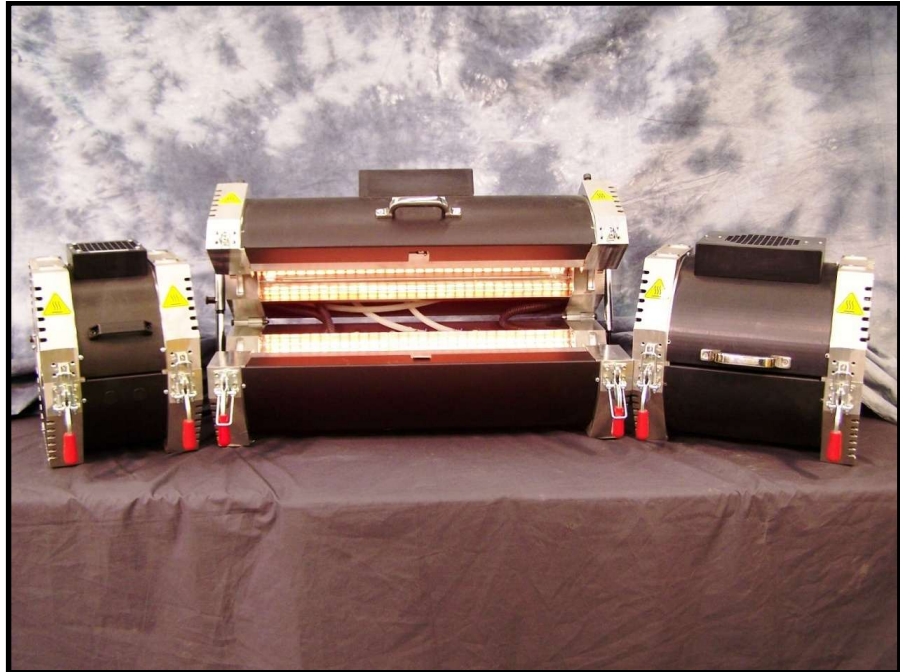


Focused Infrared Heat for Controlled Concentrated Curing

Model 4069



Focused Infrared Heat - Instant Results.

The Model 4069 infrared heater is designed to provide heat for products in continuous processes or test specimens. The Model 4069 heater focuses high-density infrared energy, generated by T-3 halogen lamps, inward toward a cylindrically shaped target area. The clamshell-style heater design allows for easy access to the heating chamber. The Model 4069 is offered in heated lengths of 5, 10, 16, 25, and 38 inches (127, 254, 406, 635, and 965 mm).

Applications

The Model 4069 infrared heaters are designed to operate horizontal or vertically in applications that requires a clean, responsive, non-contact heat source.

Some typical applications for the heater are listed below:

- Curing extruded rubbers, silicones, and plastics
- Curing PEX products
- Drying and curing paint or coatings
- Drying and curing adhesive
- Preheating
- Skin-curing rubber/silicone
- Reglossing plastic tubing
- Vulcanizing



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FAST. FOCUSED. CONTROLLED.

Features and Benefits

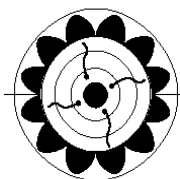
- Reach 90 percent of full operating temperature within five seconds of a cold start.
- Radiant energy dissipates to ten percent within five seconds after the power supply is disconnected.
- Clamshell-style hinged opening and standard split-quartz liner allows easy access and accurate positioning for easy startup.
- Water and air cooling allows the chamber to withstand continuous high temperature operation.
- Non-contact heat source does not come in contact with product being heated.
- 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.
- Research, Inc. manufactures a complete line of process control instruments and SCR power controllers designed with a number of features for optimum operation, and plug-and-play capability.

Description

The Model 4069 included the following major components:

Heater Module

The clamshell-style heater design allows for easy access to the heating chamber. The Model 4069 is offered in heated lengths of 10, 16, 25, and 38 inches (254, 406, 635, and 965 mm). Heated length is specified at the time the Model 4069 is ordered. Each unit is supplied with factory-installed lamps. Additional lamps can be ordered separately from the heater.



12 or 18 parabolic reflectors focus the infrared energy supplied by T-3 lamps toward the center axis.

Water Cooling

Adequate cooling water is required during operation. Each reflector is designed with an internal coolant passageway to allow coolant to flow through its entire length during operation. Flexible tubing and plumbing fittings are supplied with each heater for easy installation.

Air Cooling

A cooling fan is designed into the Model 4069 housing and provides ambient airflow through the heater body. This airflow helps to prevent air-borne contamination from depositing on the reflector surfaces. It also provides cooling to the quartz halogen lamp end seals.

Reflectors

A circular array of individual parabolic polished-aluminum reflectors direct the infrared energy generated by the quartz halogen lamps toward the center axis of the heater. Each heater houses either 12- or 18- reflectors, depending on the model. The 12-reflector model accepts product sizes up to 2 inches in diameter while the 18-reflector model accepts products up to 4 inches in diameter. The heater design allows individual reflectors to be easily removed for routine maintenance and periodic cleaning.



Figure 1: Model 4069 IR Heater

Lamps

The factory-installed ceramic end-seal T3 style quartz halogen lamps have ceramic end seals to protect the joint of each lamp lead to the lamp-emitter filament.

Quartz Liner

A split quartz liner is included with the Model 4069 and provides contamination protection for the aluminum reflectors. When installed into the heater, the quartz liner protects the aluminum reflectors and lamps from contaminants released in the heating process, resulting in maximum efficiency of the heater.

Heater Safety

An integrated flow switch is housed within the heater and is electrically connected to the power supply system. The flow switch will not allow power to be supplied to the heater unless there is sufficient coolant flow.

A thermostat is attached to the back of the reflector containing the coolant outlet fixture. This thermostat is also wired to the power control system and will cause power to be disconnected from the heater in the event the preset trip temperature is exceeded

Optional Power Control System

The Model 4069 can be ordered with a Model 935F SCR-based power control system. Specified as the 'PC' option, this power control system is a complete controlled heating solution designed with a number of features including heater on/off control switching, potentiometer local control, and mechanically interlocked doors with main power disconnect switch. Heater over-temperature indicators and system cooling on/off control switches with indicator lamps are also included. Lamp out indication circuitry is also available along with the user's choice of either a digital voltmeter or digital temperature indicator. Please contact PCS/Research Inc. sales personnel for further detail.

An electrical junction box is included and wired directly to the power control box with 15 feet (4.6m) of electrical cable. The heater is supplied with two 12-foot (3.7 m) electrical cables terminated with connectors that plug into the junction box.



Figure 2. Model 4069 with 935F Control Option

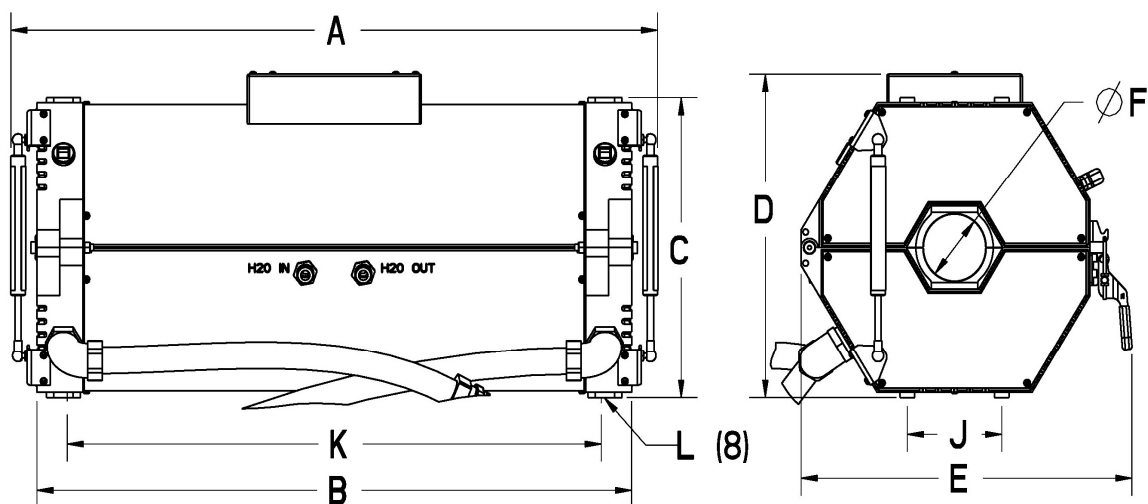
In addition, each Model 4069 heater is wired with zoning capability. Please contact Research, Inc. for more details regarding the Model 935 ControllIR® power control cabinet with zoning options.



Figure 3 Model 935F with latching connectors



Figure 4 Model 935F with digital SCR



Dimensions – Model 4069

| Model Number | Overall Dimensions, Inches (mm) | | | | | | Mounting Dimension, Inches (mm) | | |
|--------------------|---------------------------------|-----------------|---------------|----------------|----------------|---------------|---------------------------------|-----------------|-----|
| | A | B | C | D | E | ØF** | J | K | L |
| 4069-12R-05L-XX-XX | 13.44 (341) | 10.75 (273) | 14.5 (368) | 15.63 (397) | 17.11 (435) | 3.22 (82) | 4.88 (124) | 7.62 (194) | M10 |
| 4069-12R-10L-XX-XX | 18.82 (478) | 16.13 (410) | 14.5 (368) | 15.63 (397) | 17.11 (435) | 3.22 (82) | 4.88 (124) | 13.00 (330) | |
| 4069-12R-16L-XX-XX | 24.44 (621) | 21.75 (552) | 14.5 (368) | 15.63 (397) | 17.11 (435) | 3.22 (82) | 4.88 (124) | 18.62 (473) | |
| 4069-12R-25L-XX-XX | 33.44 (849) | 30.75 (781) | 14.5 (368) | 15.63 (397) | 17.11 (435) | 3.22 (82) | 4.88 (124) | 27.62 (702) | |
| 4069-12R-38L-XX-XX | 46.44 (1180) | 43.75 (1111) | 14.5 (368) | 15.63 (397) | 17.11 (435) | 3.22 (82) | 4.88 (124) | 40.62 (1032) | |
| 4069-18R-05L-XX-XX | 13.27 (464) | 10.13 (410) | 17.0 (432) | 18.55 (471) | 20.61 (523) | 5.90 (150) | 6.06 (154) | 7.62 (330) | |
| 4069-18R-10L-XX-XX | 18.27 (464) | 16.13 (410) | 17.0 (432) | 18.55 (471) | 20.61 (523) | 5.90 (150) | 6.06 (154) | 13.00 (330) | |
| 4069-18R-16L-XX-XX | 23.89 (607) | 21.75 (552) | 17.0 (432) | 18.55 (471) | 20.61 (523) | 5.90 (150) | 6.06 (154) | 18.62 (473) | |
| 4069-18R-25L-XX-XX | 32.89 (835) | 30.75 (781) | 17.0 (432) | 18.55 (471) | 20.61 (523) | 5.90 (150) | 6.06 (154) | 27.62 (702) | |
| 4069-18R-38L-XX-XX | 45.89 (1166) | 43.75 (1111) | 17.0 (432) | 18.55 (471) | 20.61 (523) | 5.90 (150) | 6.06 (154) | 40.62 (1032) | |

Specifications – Model 4069 and lamp replacement part numbers

| Model Number | Lamp Lighted Length, inches (mm) | Lamp Wattage | Lamp Type | Lamp Part Number | Lamp Rated Voltage | Wattage Heater, kW | **Water Flow GPM (LPM) | Total Weight, Pounds (kg) |
|------------------------|----------------------------------|--------------|----------------|------------------|--------------------|--------------------|------------------------|---------------------------|
| 4069-12R-05L-12kW-240V | 5 (127) | 1000 | QIH240-1000RI2 | 103390-002 | 240 | 12.0 | 1.2 (4.5) | 65 (30) |
| 4069-12R-10L-12kW-240V | 10 (254) | 1000 | QIH240-1000RI4 | 103390-003 | 240 | 12.0 | 1.2 (4.5) | 85 (39) |
| 4069-12R-10L-12kW-480V | 10 (254) | 1000 | QIH240-1000RI2 | 103390-003 | 240 | 12.0 | 1.2 (4.5) | 85 (39) |
| 4069-12R-10L-24kW-240V | 10 (254) | 2000 | QIH240-2000RI2 | 103390-004 | 240 | 24.0 | 2.3 (8.6) | 85 (39) |
| 4069-12R-10L-24kW-480V | 10 (254) | 2000 | QIH240-2000RI2 | 103390-004 | 240 | 24.0 | 2.3 (8.6) | 85 (39) |
| 4069-12R-16L-19kW-240V | 16 (406) | 1600 | QIH240-1600RI2 | 103390-005 | 240 | 19.2 | 1.8 (6.9) | 95 (43) |
| 4069-12R-16L-19kW-480V | 16 (406) | 1600 | QIH240-1600RI2 | 103390-005 | 240 | 19.2 | 1.8 (6.9) | 95 (43) |
| 4069-12R-16L-36kW-480V | 16 (406) | 3000 | QIH240-3000RI2 | 103390-012 | 240 | 36.0 | 3.6 (13.5) | 95 (43) |
| 4069-12R-16L-38kW-384V | 16 (406) | 3200 | QIH384-3200RI2 | 103390-006 | 384 | 38.4 | 3.6 (13.5) | 95 (43) |
| 4069-12R-25L-30kW-480V | 25 (635) | 2500 | QIH480-2500RI2 | 103390-007 | 480 | 30.0 | 2.8 (10.6) | 124 (56) |
| 4069-12R-38L-46kW-480V | 38 (965) | 3800 | QIH480-3800RI2 | 103390-010 | 480 | 45.6 | 4.2 (15.9) | 155 (62) |
| 4069-18R-05L-18kW-240V | 5 (127) | 1000 | QIH240-1000RI2 | 103390-002 | 240 | 18.0 | 1.7 (6.5) | 98 (45) |
| 4069-18R-10L-18kW-240V | 10 (254) | 1000 | QIH240-1000RI2 | 103390-003 | 240 | 18.0 | 1.7 (6.5) | 112 (51) |
| 4069-18R-16L-29kW-240V | 16 (406) | 1600 | QIH240-1600RI2 | 103390-005 | 240 | 28.8 | 2.7 (10.2) | 140 (64) |
| 4069-18R-25L-45kW-480V | 25 (635) | 2500 | QIH480-2500RI2 | 103390-007 | 480 | 45.0 | 4.2 (15.7) | 177 (80) |
| 4069-18R-38L-68kW-480V | 38 (965) | 3800 | QIH480-3800RI2 | 103390-010 | 480 | 68.4 | 3.1 (11.9)* | 228 (104) |

* Stated flow rates are for each of two flow paths

** Maximum inlet-water temperature not to exceed 100 °F (37 °C)

4069 with 5 inch heated length – new 2011





Infrared Heaters for Controlled Concentrated Curing.

Ordering Information

| Base Number | | Number of reflectors / Lamps | | Reflector / Lamp length / inches | | Kilowatts / rated voltage | | Rated Voltage / Three Phase | | Options |
|-------------|---|------------------------------|---|----------------------------------|---|---------------------------|---|-----------------------------|---|---------|
| 4069 | - | 12R | - | 5L | - | 12KW | - | 240V | - | |
| 4069 | - | 12R | - | 10L | - | 12KW | - | 240V | - | |
| 4069 | - | 12R | - | 10L | - | 12KW | - | 480V | - | |
| 4069 | - | 12R | - | 10L | - | 24KW | - | 240V | - | |
| 4069 | - | 12R | - | 10L | - | 24KW | - | 480V | - | |
| 4069 | - | 12R | - | 16L | - | 19KW | - | 240V | - | |
| 4069 | - | 12R | - | 16L | - | 19KW | - | 480V | - | |
| 4069 | - | 12R | - | 16L | - | 36KW | - | 480V | - | |
| 4069 | - | 12R | - | 16L | - | 38KW | - | 384V | - | |
| 4069 | - | 12R | - | 25L | - | 30KW | - | 480V | - | |
| 4069 | - | 12R | - | 38L | - | 46KW | - | 480V | - | |
| 4069 | - | 18R | - | 5L | - | 18KW | - | 240 | - | |
| 4069 | - | 18R | - | 10L | - | 18KW | - | 240 | - | |
| 4069 | - | 18R | - | 16L | - | 29KW | - | 240 | - | |
| 4069 | - | 18R | - | 25L | - | 45KW | - | 480 | - | |
| 4069 | - | 18R | - | 38L | - | 68KW | - | 480 | - | |

Ordering Example

| | Model | Reflector Number | Heated Length | Power rating | Voltage | Options |
|-------------------------|--------------|------------------|---------------|--------------|--------------|---------|
| Typical Ordering Number | 4069- | 18R- | 25L- | 45kW- | 480V- | |

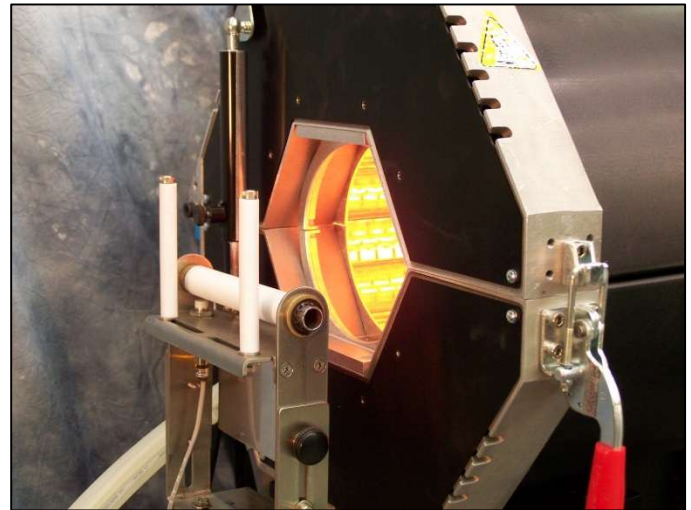
Example above includes:

Model: 4069 heater with 18 reflectors and 2500 watt lamps at 480 volts. Optional equipment includes a Power Control System with Digital Temperature Indicator – 50 Amp Rating.



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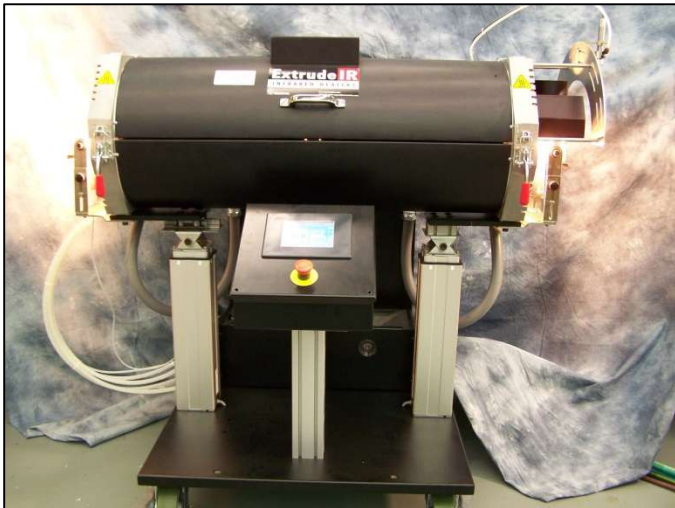
-----Horizontal extrusion-----

Model 4069E (tubular) – one zone
Model 4069P (profile) – six zone

The Models 4069 E & P are in-line horizontal extrusion systems with electric height & tilt adjustment. Touch screen operator display is mounted on a front pedestal with a safety e-stop button. The on-board control system is available with one zone for tubular extrusions or 6 zones for profiles. Chambers are available with 10 to 38 inches (250- 965mm) heated lengths and with a 3 or 6 inch ID. Heater protection is provided with an integrated water flow switch and thermostat switch connected to the control logic to prevent heater damage if coolant flow is interrupted.

The following options are available:

- 4069-MD Product guides located at the entrance and exit with a line start/stop sensor will automatically turn lamps on/off based on line movement and prevent thermal damage to the extrusion.
- 4069-OPM Optical pyrometer to read and display product surface temperature at chamber exit
- 4069-ANOZ air nozzle at the entrance will send a stream of compressed air down the chamber to push smoke and fumes toward the chamber exit.
- 4069-EXH metal exhaust hood with collar used to evacuate smoke and fumes from the heating process with customer supplied blower and ducting.
- 4069-LIFT system is fitted with an air cylinder to automatically lift the chamber lid when the line stops, closed when the line starts.





-----Vertical extrusion-----

Structural aluminum framework is used to support a single or two 4069 IR chambers for vertical extrusion process. Frame also supports the control system, capstan wheel and drive system, remote operator display and downstream mounting for a laser gauge, printer and cutter systems. A motorized guide wheel aligns the extruded product in the center of the chamber from the operator touch screen.

The following options are available:

- Track mount - Tower structure is mounted on a track linear bearings and can move in-line or perpendicular to the line flow.
- Heater Lift - Motorized actuator provides 12" of vertical chamber position adjustability for extruder maintenance
- Optical IR Camera - IR camera to read and display product surface temperature on user HMI. Includes lens cap, air cooling, heat shield and video output to view extrusion without climbing the tower
- Downstream Equipment Mounting- Accommodations to mount a variety of downstream equipment including printers, laser gauges, X-Ray systems, air ionizers, etc
- Remote operator console with pivoting arm and color touch screen display.
- 4069-LIFT system is fitted with an air cylinder to automatically lift the chamber lid when the line stops, closed when the line starts.

| Application Chart | | Family | | | | | | | | | |
|-------------------|--------------------------------|--------------|---------|----------|----------|------------|------------|-----------|------------|--------|-------------|
| | | Heat Profile | | | | | | | | | |
| | | Spot IR | Line IR | Strip IR | Panel IR | Chamber IR | Hi-Temp IR | Module IR | Lo-Temp IR | Dry IR | Simulate IR |
| Coatings | Cure and Melt Powders | | | | | | | | | | |
| | Dry and Cure Paints | | | | | | | | | | |
| | Dry Inks | | | | | | | | | | |
| | Dry Adhesives | | | | | | | | | | |
| Composites | Preheating | | | | | | | | | | |
| | Resin Curing | | | | | | | | | | |
| | Curing | | | | | | | | | | |
| | Filament Winding | | | | | | | | | | |
| Electronics | Laminating | | | | | | | | | | |
| | Ceramic Processing | | | | | | | | | | |
| | Shrink Insulation | | | | | | | | | | |
| | Soldering/ Desoldering | | | | | | | | | | |
| Material Testing | Thick Film Drying | | | | | | | | | | |
| | Wafer Processing | | | | | | | | | | |
| | Aerodynamic Heating Simulation | | | | | | | | | | |
| | Coupon Tests | | | | | | | | | | |
| Metal Processing | Structural Tests | | | | | | | | | | |
| | Thermal Stress Test | | | | | | | | | | |
| | Annealing | | | | | | | | | | |
| | Brazing | | | | | | | | | | |
| Plastics | Preheating | | | | | | | | | | |
| | Soldering | | | | | | | | | | |
| | Spring Stress Relief | | | | | | | | | | |
| | Weld Stress Relief | | | | | | | | | | |
| Reglossing | Activating Thermo Transfer | | | | | | | | | | |
| | Bending | | | | | | | | | | |
| | Bonding | | | | | | | | | | |
| | Preheating | | | | | | | | | | |
| Rubber/ Silicone | Thermofforming | | | | | | | | | | |
| | Welding | | | | | | | | | | |
| | Chocolates | | | | | | | | | | |
| | Cosmetics | | | | | | | | | | |
| Rubber/ Silicone | Plastic Tubing | | | | | | | | | | |
| | Soap | | | | | | | | | | |
| | Curing | | | | | | | | | | |
| | Pre-Cure | | | | | | | | | | |
| Rubber/ Silicone | Preheating | | | | | | | | | | |
| | Vulcanizing | | | | | | | | | | |