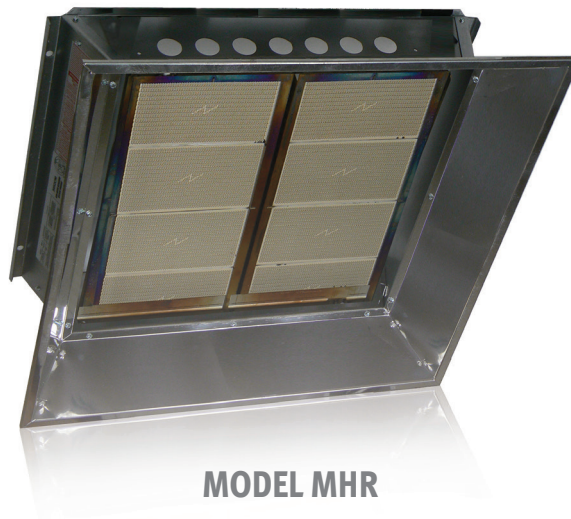




GAS-FIRED HIGH AND LOW INTENSITY INFRARED HEATERS



MODEL MHR



MODEL IPT



This catalog describes the design and construction features and benefits, typical applications, dimensional data, and configurations available for the MHR and ITP Series.

Modine's MHR Series is a gas-fired, high intensity ceramic infrared heater. Ideal for spot heating, the MHR series offers simple gas and power connections, as well as inexpensive maintenance.

Modine's IPT Series sets the industry standard for low intensity infrared heating performance and installation versatility. The comfort and uniform heating provided by the IPT Series are second to none.

Table of Contents

General Unit Applications..... 2

 Infrared Heating Defined.....2

 Advantages of Infrared Heating2

 Typical Applications.....2

Modine Breeze® AccuSpec Sizing and Selection Program3

Features and Benefits - Model MHR.....4

Features and Benefits - Model IPT5

Performance and Dimensional Data - Model MHR6-7

Performance, Utilities, and Clearance - Model IPT8

Dimensional Data - Model IPT9

Specifications and Model Nomenclature - Model MHR10

Specifications and Model Nomenclature - Model IPT11



Refer to page 3 for information regarding the Breeze® AccuSpec Sizing and Selection Program



Infrared Heating Defined

Infrared heating systems rely upon the transfer of radiant energy from hot heat exchanger surfaces (up to 1850°F for high intensity heaters) through the air to cooler surfaces, without the use of an air mover. Since radiant energy always travels in a straight line from its source, people and objects within a direct line-of-sight of the heat exchanger become warmed immediately.

While capable of being used for total building heating or large area heating, they are ideally suited for spot heating applications. Spot heating involves small areas such as loading dock doors and single person work cells.

Advantages of Infrared Heating

- No air mover, reducing electricity and maintenance costs while increasing worker comfort from the absence of drafts and annoying fan noise.
- Quick temperature recovery, as only objects need to be heated, not large volumes of air.
- Significant energy savings through use of zone control and/or spot heating, which heats objects without the need to heat large air volumes.

Typical Applications

The following are examples of applications that can benefit from high-intensity infrared heating:

- Manufacturing facilities
- Vehicle repair centers
- Warehouses and loading docks
- Aircraft hangars
- Indoor tennis courts
- Indoor golf driving ranges
- Emergency vehicle garages
- Indoor stadium seating areas

The following are examples of applications that can benefit from low-intensity infrared heating:

- Manufacturing facilities
- Vehicle repair centers
- Warehouses and loading docks
- Aircraft hangars
- Tennis courts
- Car washes
- Golf driving ranges
- Covered walkways
- Emergency vehicle garages
- Stadium seating areas
- Vestibules

See Infrared Design and Engineering Guide 9-200 for additional application information.

WARNING

Do not locate ANY gas-fired unit in areas where chlorinated, halogenated or acid vapors are present in the atmosphere.

WARNING

Do not install in potentially explosive or flammable atmosphere laden with dust, sawdust, or similar airborne materials.

As Modine Manufacturing Company has a continuous product improvement program, it reserves the right to change design and specifications without notice.

The Modine Breeze® AccuSpec is the fastest way to generate performance data based on actual job conditions. The Breeze® AccuSpec program is a web-based sizing and selection program. The program provides a series of step-by-step questions that allow for the easy configuration of Modine products. After a model has been configured, the program can generate Submittal Schedules, Submittal Data (including performance and dimensional drawings), and Specifications.

The image displays three overlapping screenshots of the MODINE BREEZE AccuSpec software interface, showing different stages of the product selection process.

Top Screenshot: The 'Convert' dialog box is open. It shows 'Job Name : <None Assigned>' and 'Transaction # : <None Assigned>'. The 'MODINE BREEZE AccuSpec' logo is visible. Navigation buttons include 'Configure', 'Previous', 'Next', 'Add to Cart', 'Reset Unit', and 'Cancel'.

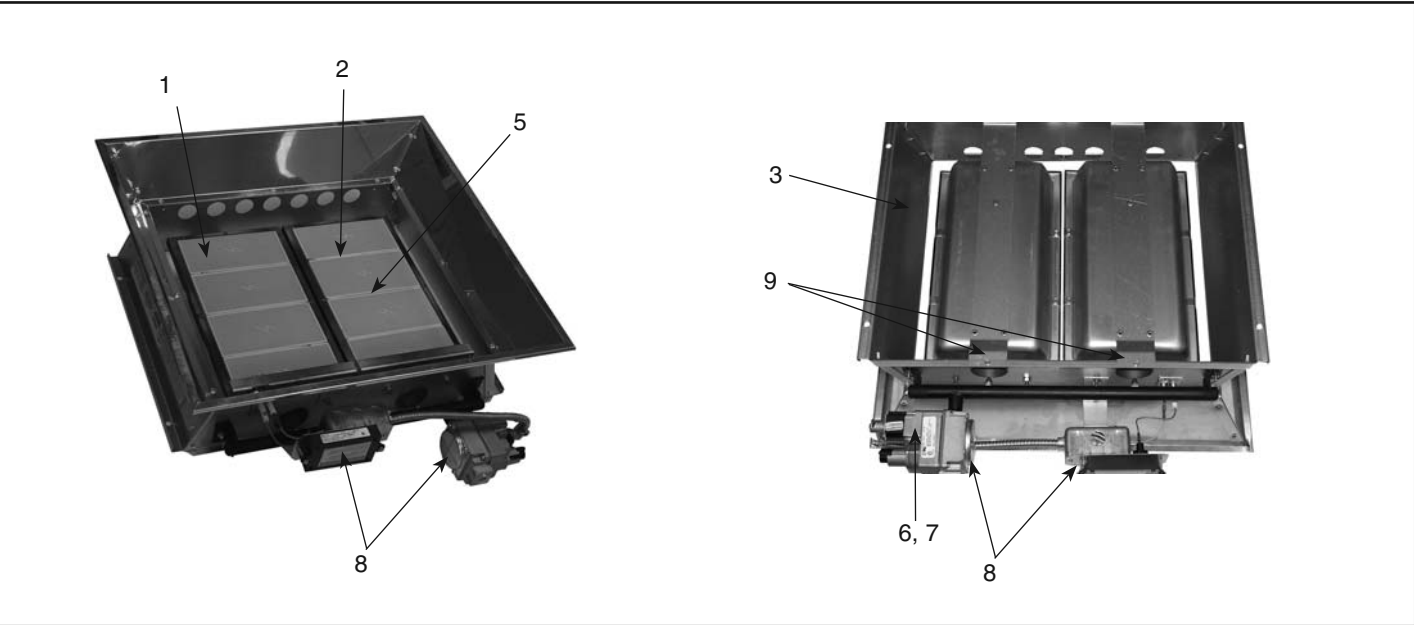
Middle Screenshot: The 'Model IPT 591' screen is shown. It displays a table of input blinks and recommended mounting heights. The table has columns for 'Model Size', 'Input Blinks', and 'Recommended Mounting Height(Ft)'. The 'MODINE BREEZE AccuSpec' logo and navigation buttons are also present.

Bottom Screenshot: The 'Model IPT 75501' screen is shown. It displays a table of input blinks and recommended mounting heights. The table has columns for 'Model Size', 'Input Blinks', and 'Recommended Mounting Height(Ft)'. The 'MODINE BREEZE AccuSpec' logo and navigation buttons are also present.

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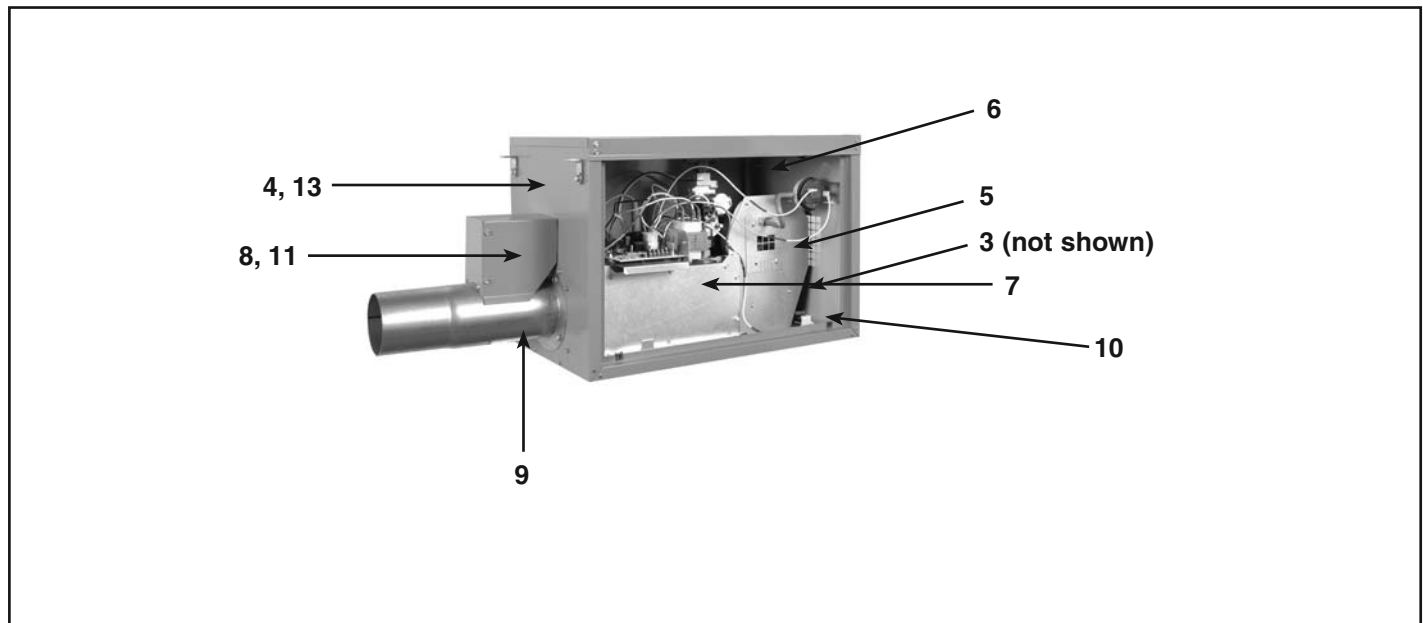


Figure 4.1 - Construction Features - Model MHR



Features	Benefits
1. High temperature cordierite-based grooved ceramic tiles with perforations along both the top and bottom of the grooves	1. Increased temperature and surface area to provide maximum heat transfer while maintaining lower gas input ratings.
2. Polished aluminum reflectors	2. Efficiently direct radiant heat to the desired area, for increased comfort over wider areas.
3. 16 gauge aluminized steel frame	3. Provides support for simple chain mounting.
4. No air mover is utilized	4. Eliminates fan noise, drafts, maintenance and reduces electrical energy costs.
5. Input ranges from 30,000 Btu/hr through 200,000 Btu/hr in Natural or Propane gas	5. Wide input range to accommodate a variety of heating requirements
6. Direct spark or self-energizing standing pilot ignition	6. Maximize application flexibility.
7. 115V, 25V, or millivolt controls	7. Accommodate a wide range of electrical inputs.
8. Externally-mounted controls	8. Allow convenient access to gas valve, control system, transformer, and gas orifices, increasing ease of installation and service.
9. Burners are replaced by removing one fastener	9. Eliminates the removal of the unit from its mounted position for service.
10. CSA design certification for indoor, unvented operation in commercial and industrial installations	10. Assures that the unit conforms to national safety standards.
11. Propane and/or High Altitude kits for field conversions	11. Allows for quick and easy field modification of unit to use propane gas and/or operate at elevations of up to 7,000 feet above sea level.

Figure 5.1 - Construction Features



Features	Benefits
1. Heat-treated darkened aluminized steel tubes	1. Heat-treated darkening increases both radiant heat output for more heat near the end of the tube system and eliminates the scratching and flaking that can occur with painted tubes. Aluminized steel provides corrosion resistance for longer life.
2. Polished aluminum reflectors	2. Direct radiant heat from the tubes to the desired area, for increased comfort over wider areas.
3. Removable side-access panels on both sides of the burner box	3. Can be removed completely while accessing either side of the unit.
4. Durable polyester-powder paint	4. Maintains life-long new appearance.
5. Permanently-lubricated combustion blower motor	5. Reduces maintenance.
6. 180 degree-rotating gas valve	6. Allows convenient access from either side of the burner box.
7. Sealed burner compartment	7. Allows manifold pressure adjustments during unit operation, which increases ease of installation and service.
8. Flame sensor and ignitor mounted externally to the combustion chamber	8. Improve service access.
9. Flame observation window on underside of combustion chamber	9. Provides a convenient visual check of unit operation from ground level.
10. Gas valve operation light on back panel on the unit	10. Indicates that the combustion blower is operating.
11. Four-trial separate flame sensor	11. Provides reliable ignition.
12. System approval for vented and common vented installation	12. Maximizes installation flexibility.
13. Weatherproof, water-resistant casing	13. Maximizes application flexibility for both indoor and outdoor installation.
14. ETL design certification	14. Assures that the unit conforms to national safety standards.

Table 6.1 - Performance and Dimensional Data

Model	Gas Controls ④ ⑤	Input Rating (Btu/hr)		Recommended Mounting Height (ft.) ①				Dimensions (in) ②		Ship Wt. (lbs) ③	Radiating Area (sq. in.)
				Standard Reflector		Parabolic Reflector					
		Natural	Propane	0° Angle	30° Angle	0° Angle	30° Angle	A	B		
MHR 30	Single Stage or Millivolt	30,000		11.0-13.0	10.0-12.0			16.625	14.625	30	173
MHR 50	Single Stage or Millivolt		50,000	13.5-15.5	12.5-14.5	15.5-18.5	14.0-17.0				
MHR 60	Single Stage or Millivolt	60,000		14.5-16.5	13.0-15.0	16.0-20.0	15.0-18.0				
MHR 90	Single Stage or Millivolt	90,000	90,000	16.0-18.5	14.5-17.0	19.5-22.5	17.5-20.5	25.25	23.25	36	346
	Two Stage		90,000/45,000	16.0-18.5	14.5-17.0	19.5-22.5	17.5-20.5				
MHR 100	Single Stage or Millivolt	100,000		17.0-19.5	15.0-17.5	20.5-23.5	18.5-21.5				
	Two Stage	100,000/50,000		17.0-19.5	15.0-17.5	20.5-23.5	18.5-21.5				
MHR120	Single Stage or Millivolt	120,000	120,000	17.5-21.0	15.5-18.5	21.5-25.0	20.0-23.0	42.500	40.500	62	692
	Two Stage		120,000/80,000	17.5-21.0	15.5-18.5	21.5-25.0	20.0-23.0				
MHR150	Two Stage	150,000/100,000		18.5-22.5	16.5-20.0	24.0-27.5	21.5-24.5				
MHR160	Single Stage or Millivolt	160,000	160,000	19.0-23.0	17.0-20.5	25.0-28.5	22.5-25.5				
MHR160	Two Stage		160,000/80,000	19.0-23.0	17.0-20.5	25.0-28.5	22.5-25.5				
MHR200	Single Stage or Millivolt	200,000		20.5-25.0	18.5-22.5	27.0-31.0	24.5-28.0	42.500	40.500	62	692
	Two Stage	200,000/100,000		20.5-25.0	18.5-22.5	27.0-31.0	24.5-28.0				

① See Table 7.1 for allowable mounting angles.

② See Figure 6.1.

③ Add 5 lbs for units with 2-stage gas controls.

④ Single stage and two stage controls are direct spark ignition with 100% safety shutoff and are available as either 115V or 24V (except two-stage which is 24V only).

⑤ Millivolt controls are self-energizing standing pilot requiring no external power source. Units include a millivolt thermostat and 35 feet of wire.

Figure 6.1 - Unit Dimensional Drawing

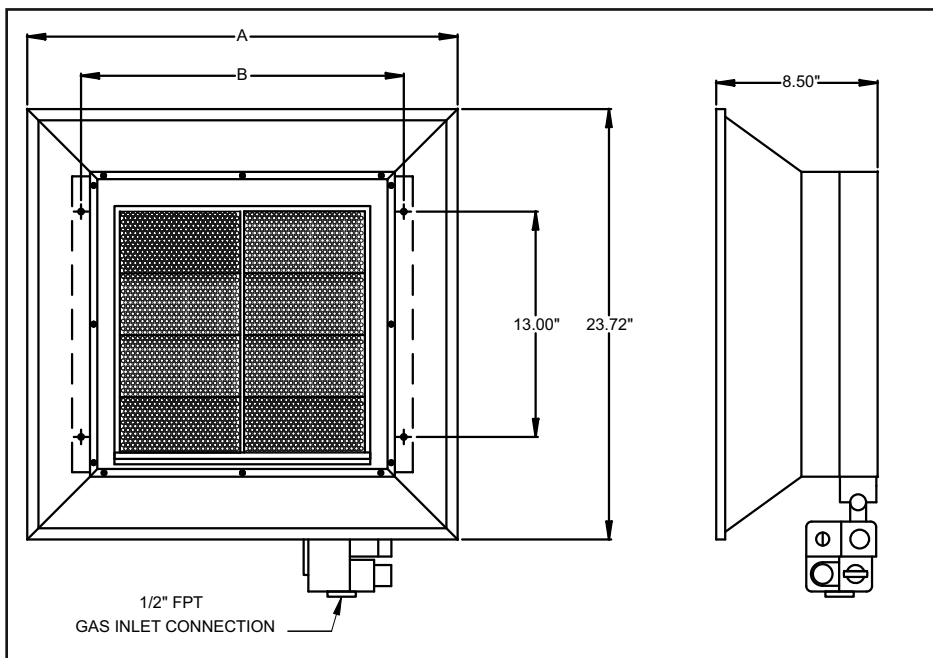


Table 7.1 - Allowable Mounting Angle Range

Model Size	Allowable Mounting Angle Range
30 – 60	0° – 30°
90 – 100	5° – 29°
120 – 150	0° – 30°
160	5° – 29°
200	0° – 30°

Table 7.2 - Clearances to Combustible Materials (See Figure 5.1)

Model Sizes	30-60 ①②	90, 100 ③	120, 150	160, 200
SIDE OF HEATER	30"	36"	46"	48"
BACK OF HEATER	30"	30"	33"	33"
TOP OF HEATER:				
- Mounted 0-29°	60"	62"	64"	68"
- Mounted 30° only	48"	50"	58"	68"
- w/ Optional Heat Deflector 0-29°	34"	38"	N/A	N/A"
- w/ Optional Heat Deflector 30° only	34"	38"	N/A	N/A"
BELOW HEATER:				
- Standard Reflector	80"	105"	125"	140"
- w/ Optional Parabolic Reflector	110"	135"	165"	180"

① 30MBH models not available in Canada.

② 60MBH models require a re-radiating wire grid accessory for use in Canada.

③ See Table 7.1 for allowable mounting angles.

Figure 7.1 - Clearances to Combustibles (See Table 7.2)

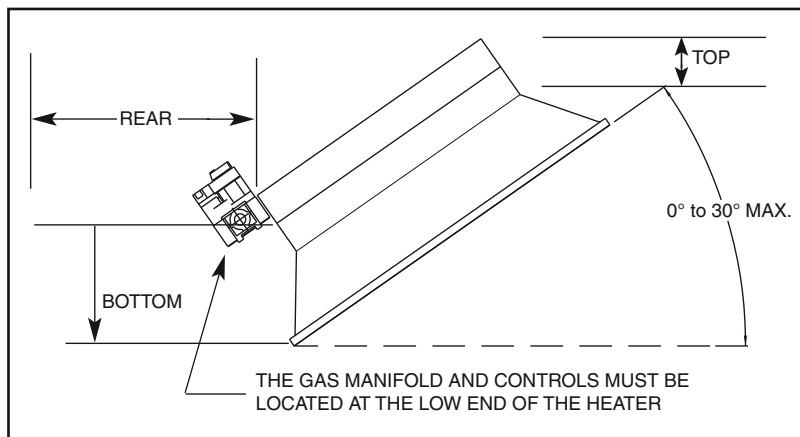


Table 8.1 - Performance

Input MBH	50	60	75	100	125	150	175	200
Certified Tube Lengths (ft.)	20, 30	20, 30, 40	20, 30, 40	30, 40, 50 ②	40, 50, 60	50, 60	50, 60, 70 ③	50, 60, 70 ③
Recommended Mounting Height (ft.) ①	10 – 12	10 – 12	12 – 14	12 – 14	15 – 22	15 – 22	18 – 28	20 – 30
Recommended Tube System Application ①	Spot or Area Heating	U-Tube						
	Total Building Heating	Straight Tube						

① Recommended Mounting Height and Tube System Applications are meant as a general guide and are adjusted to meet the requirements of the actual application. The applications are as follows:

- Spot or Area Heating is an application where occupant comfort is the goal and occupant(s) are either relatively stationary (Spot - Example: small work cell or dispersed over a slightly wider range than with Spot Heating (Area - Example: assembly line). Mounting height is typically at the low end of the range shown above.
- Total Building Heating is an application where average space temperature is to be maintained, however due to the significant temperature gradient differences on long straight tube systems, areas may exist where direct occupant comfort is not achieved.

② IPT 100 not available for Propane Gas operation at 50 ft. tube system length.

③ IPT 75 not available for Propane Gas operation at 40 ft. tube section length.

Table 8.2 - Utilities

Electrical Rating	Gas Connection (inch)	Minimum Gas Inlet Pressure (" W.C.)	Maximum Gas Inlet Pressure (" W.C.)	Manifold Gas Pressure (" W.C.)	Tube/Vent Diameter (inch)
60Hz/1Ph	1/2 NPT	7.0 (natural gas) 11.0 (propane gas)	14.0	3.5 (natural gas) 10.0 (propane gas)	4 (O.D.)

Table 8.3 - Combustible Material Clearances ① ② ③

IPT			
Combustible Material Clearances (inches)			
Input MBH	"A" ①	"B" ②	"C" ③
50/60	9	64	20
75/100/125	9	76	24
150/175/200	12	106	38

① Clearance to each end and above the U-Tube is 12 inches.

② In unvented applications, clearance from radiant tube end is 36" in all directions.

③ Refer to Figures 8.1 through 8.3.

Figure 8.2 - Stacking Height

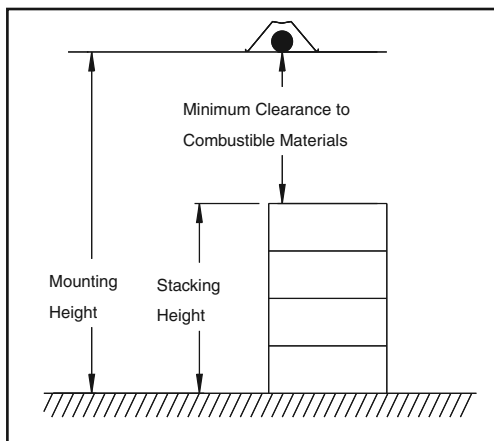


Figure 8.1 - Combustible Material Clearances - Straight Tube

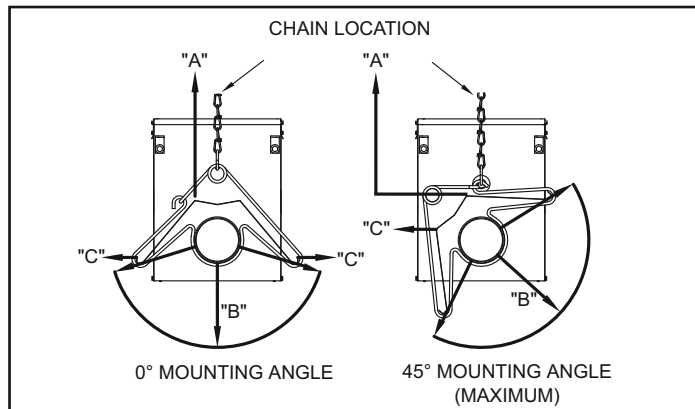


Figure 8.3 - Combustible Material Clearances - U-Tube

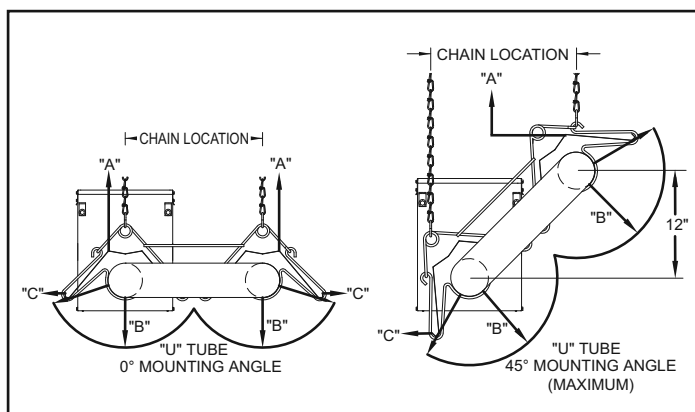


Figure 9.1 - Casing Dimensions

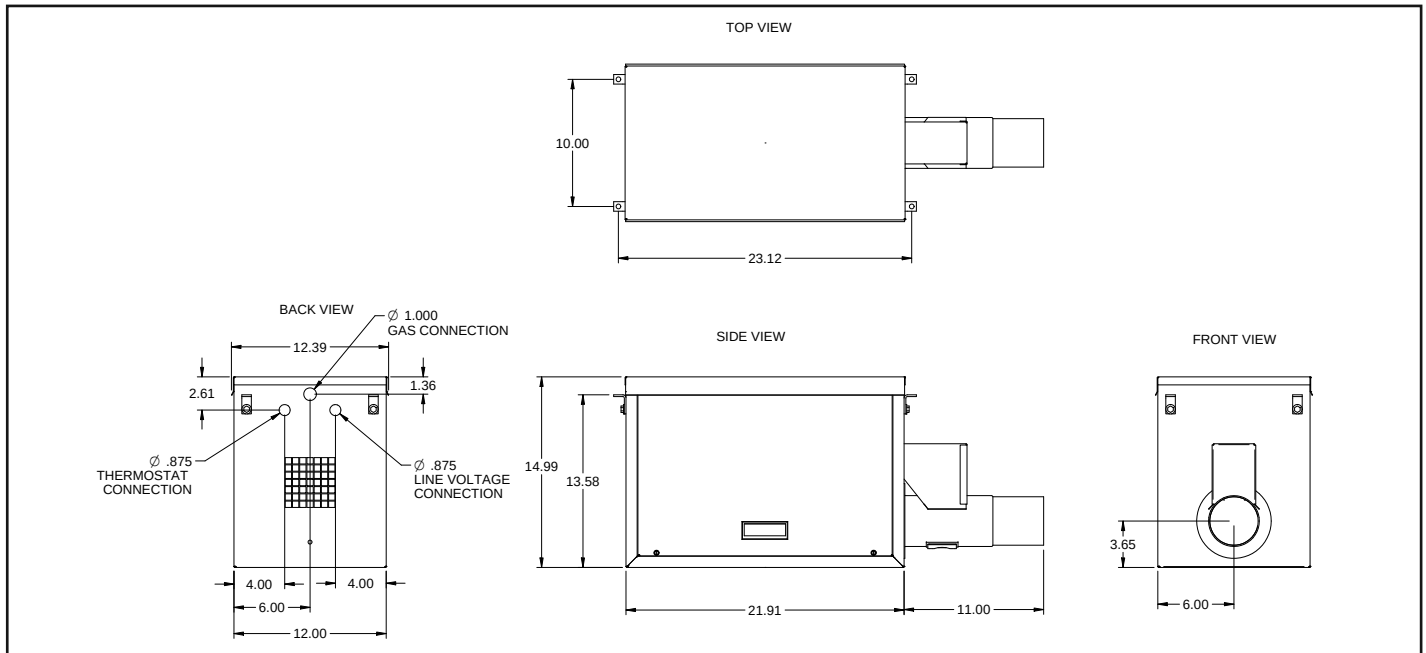


Figure 9.2 - Burner and Tube System Dimensions

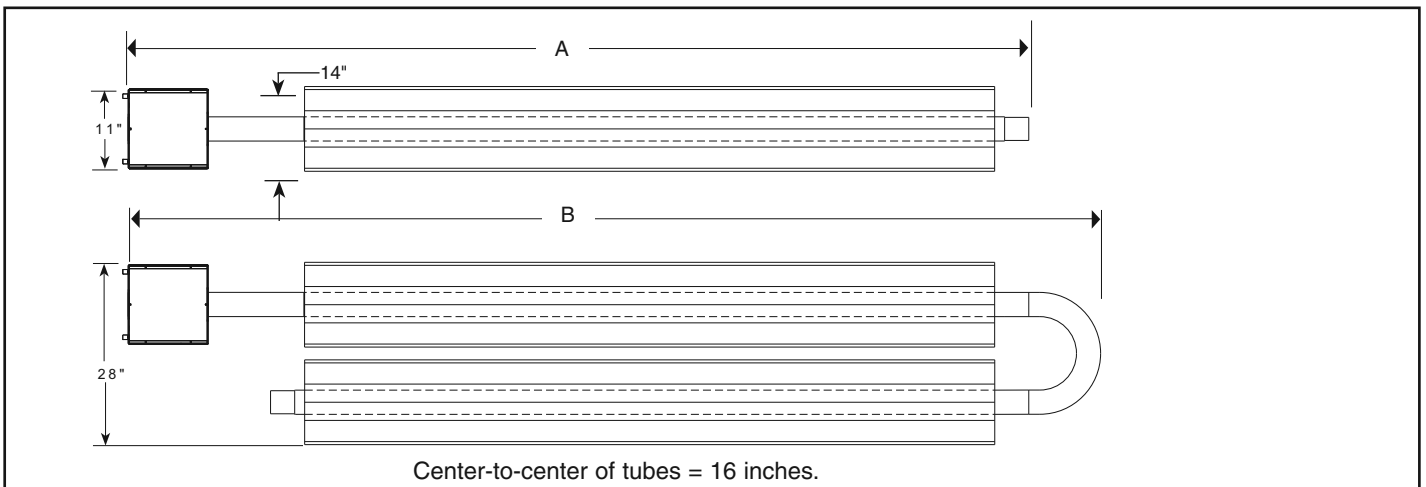


Table 9.1 - Tube Systems Data

Tube Length (ft.)	Straight Tube		U-Tube System	
	System Length "A" (ft.)	System Weight (lb.)	System Length "B" (ft.)	System Weight (lb.)
20	23	78	13	89
30	33	112	18	132
40	43	146	23	157
50	53	180	28	200
60	63	214	33	225
70	73	252	38	277

Table 9.2 - Burner Shipping Weights

Model	Shipping Wt. (lb.)
All Burners	43



General

Contractor shall furnish and install Modine model MHR high intensity infrared heater(s). The infrared heater(s) shall be CSA International design certified and manufactured in compliance with the harmonized standard Z83.19.19 CSA 2.35-latest edition have CSA (Canadian Standards Association) design certification for use in both the US and Canada.

Certified as unvented appliances, the space in which the units operate must be vented by mechanical air displacement of 4 CFM for natural or 5 CFM for propane gas (In Canada: 3 CFM for natural or 4 CFM for propane gas) per 1,000 BTUH input.

Casing

The main frame shall be 16 Ga. (.065") corrosion-free aluminized steel and of no weld construction. The main frame shall have a double turned upper edge. The side frames shall have four (4) 3/8" holes for easy mounting of an "S" hook and chain.

Burner

The burner(s) shall include the ceramic combustion surface, a plenum chamber, and a venturi mixer and shall be removable with a single screw for cleaning or replacement without disconnecting any gas, electrical or hanging device.

The ceramic combustion surface shall be capable of reaching temperatures up to 1850°F. It shall be a cordierite-based grooved ceramic of an exclusive permeable design whereby alternate rows of 230 perforations per square inch terminate at the bottom of slots making one half of the flame below the top surface of the ceramic and creating a greater surface area. This will increase the ceramic surface temperature and the radiant output while maintaining a lower gas input and achieving greater resistance to air movement disturbance.

The plenum chamber shall be of 20 Ga. (.035") corrosion-free aluminized steel with one-piece fabrication and seamless no-weld construction. The plenum chamber shall utilize a one-piece stainless steel retainer to hold the ceramic surface in place around its entire perimeter and a 14 Ga. (.083") aluminized steel, back bracket to achieve proper alignment of the surface, venturi, and orifice.

Reflectors

Reflectors shall be of 21 Ga. (0.032") Mirror Brite Aluminum Finish (highly polished) with .352 square feet of reflective area per linear foot. Reflector design (shape) shall be of standard design and be mounted to the heater at the factory. Material finish shall have a reflectivity of not less than 98%. The reflector shall have a double turned lower edge for rigidity.

(Optional) An accessory field installed parabolic reflector extension shall be included for concentrating infra-red energy, usually for spot heating or higher mounting height applications.

Controls

Heater(s) shall be equipped with (check one):

- ☐ Single-stage, direct spark ignition control with 100% safety shut-off with flame monitoring. Controls shall operate on 115V/60Hz/1ph (Alternate: 24V) with 6VA maximum power consumption.
- ☐ Two-stage, direct spark ignition control with 100% safety shut-off with flame monitoring. Controls shall operate on 24V/60Hz/1ph with 6VA maximum power consumption.

- ☐ Self-energizing millivolt controls. Heater(s) shall be equipped with a safety shut-off, manually lit pilot. The constant pilot flame shall energize the 750 mV power pile, which shall energize the control circuit. Millivolt control option shall include a compatible millivolt thermostat and 35 ft. of 18-2 wire.

Controls shall be exterior mounted for easy accessibility.

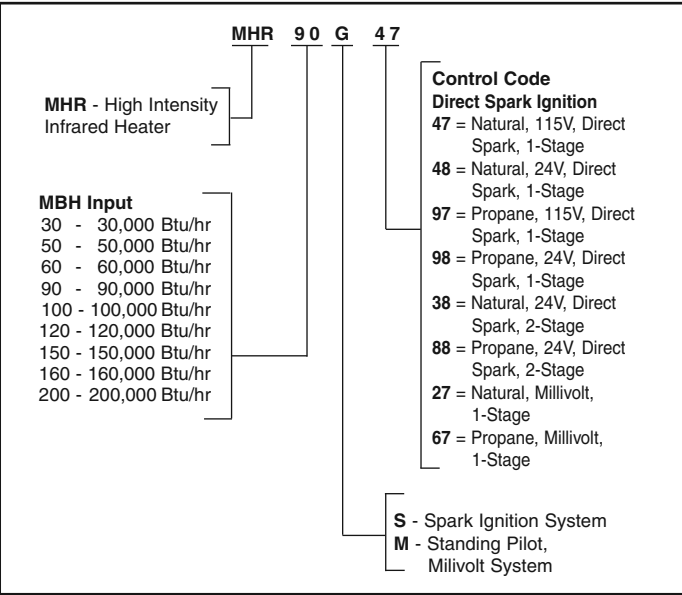
All controls shall be rated for a maximum inlet pressure of 1/2 PSI gas pressure. Controls shall be designed for Natural gas having a specific gravity of 0.60, a Btu content of 1050 Btu/ft3 (Alternate: Propane gas having a specific gravity of 1.53, a Btu content of 2500 Btu/ft3) at 0-2000 feet elevation.

Accessories

The following field installed accessories shall be included (check those that apply):

- ☐ A protective screen to protect the ceramic tiles from damage caused by the entrance of foreign objects.
- ☐ A heat deflector to permit reduced clearance above the heater. Refer to the Dimensions page for required clearance to combustible materials data.
- ☐ A re-radiating wire grid for increased radiant efficiency.
- ☐ A chain mounting kit that consists of 20 feet of chain and 8 "S" hooks.
- ☐ A flexible stainless steel gas connector, 1/2" MPT x 24" long. Also included is a gas ball valve with a 1/8" pressure test plug.
- ☐ A single-stage thermostat, 40-80°F temperature range, capable of controlling up to 20 heaters.
- ☐ A two-stage microprocessor based thermostat with 50-90°F temperature range, digital LCD display, rated 1.0A @ 24VAC.

Figure 10.1 - Model Number Designations



General

Contractor shall furnish and install Modine model _____ low intensity infrared heater(s). The low intensity infrared system shall be straight tube _____, U-tube _____ configuration. Performance shall be as indicated on the equipment schedule in the plans. The infrared heater(s) shall be certified for indoor and outdoor installations. Infrared heater(s) shall have ETL design certification for use in both the US and Canada.

Casing

The controls, combustion air blower and burner shall be housed in a water-resistant casing, providing weatherproof protection. The burner and control box casing shall be constructed of not less than 20 gauge aluminized steel. After forming, the casing parts shall be cleaned of all oils and a phosphate coating applied prior to painting. The phosphated parts shall then be finished with an electrostatically applied, gray-green polyester powder paint finish. The applied polyester powder paint shall be baked on to provide an attractive finish on all of the exposed casing parts.

Heat Exchanger

The heat exchanger tubes and combustion chamber shall be constructed of 16 gauge, 4" O. D. aluminized steel, and the first combustion tube for gas inputs 150,000 Btuh and greater shall be 16 gauge 4" O. D. 409 Aluminized Stainless Steel. The last heat exchanger tube shall incorporate a turbulator baffle for maximum efficiency of heat transfer.

The heat exchanger tubes must be used in conjunction with reflectors. The reflector can be adjusted from 0° to 45° from the horizontal plane. Reflectors shall be of bright polished aluminum.

Controls

Input power to the infrared heater(s) shall be 115V/60Hz/1ph. Heater(s) shall be equipped with a direct four-trial (three re-trial), 100% shut-off electronic ignition control system with a separate flame sensor. Infrared heater(s) shall be equipped with a 115V/25V control transformer. Thermostat shall operate on 25V. Heater(s) will be equipped with a pre-purge mode, a differential pressure switch, and an indicator light to prove proper operation of the gas valve. All controls shall be rated for a maximum inlet pressure of 1/2 PSI gas pressure.

Controls shall be designed for natural _____, propane _____ gas having a specific gravity of _____, a Btu content of _____ Btu/ft³ at _____ feet elevation.

Motor

Each heater shall have a single motor. The combustion air blower motor shall be totally enclosed in the control box and the motor shall be protected by a thermal overload switch. The motor shall be .03 H.P., 115 volt, 60 Hz, single phase, with an operating speed of 3000 rpm.

Figure 11.1 - Model Number Designations

DIGIT SEQUENCE	1, 2, 3	4, 5, 6	7	8, 9	10, 11
MODEL NUMBER	<u>IPT</u>	<u>200</u>	<u>S</u>	<u>01</u>	<u>11</u>
MODEL PREFIX: IMPROVED PRESSURE TUBE: IPT		MODEL SIZE: MBH INPUT: 50, 60, 75, 100, 125, 150, 175, 200			CONTROL CODE: 11: SINGLE STAGE, NATURAL GAS 21: SINGLE STAGE, PROPANE GAS
					POWER CODE: 01: 115V/60HZ/1PH
		IGNITION TYPE: S: DIRECT SPARK			

Products from Modine are designed to provide indoor air-comfort and ventilation solutions for residential, commercial, institutional and industrial applications. Whatever your heating, ventilating and air conditioning requirements, Modine has the product to satisfy your needs, including:

HVAC

- Unit Heaters:
 - Gas
 - Hydronic
 - Electric
 - Oil
- Ceiling Cassettes
- Duct Furnaces
- Hydronic Cabinet Unit Heaters, Fin Tube, Convectors
- Infrared Heaters
- Make-up Air Systems
- Unit Ventilators

Ventilation

- Packaged Rooftop Ventilation

School Products

- Vertical Packaged Classroom HVAC:
 - DX Cooling/Heat Pump
 - Water/Ground Source Heat Pump
 - Horizontal/Vertical Unit Ventilators

Geothermal

- Water-to-Water
- Water-to-Air
- Combination

Specific catalogs are available for each product. Catalogs 75-136 and 75-137 provide details on all Modine HVAC equipment.



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