

## ***Gas-Fired Vacuum Low Intensity Infrared Heaters Series MV***



Modine's MV Series provides reliable low intensity infrared heating performance and installation versatility, where vacuum systems are required.

**Design Summary:**

- Vacuum-type tubular infrared heating system
- Burner inputs of 75,000 Btuh through 150,000 Btuh
- Available in Natural Gas only
- 20 to 60 foot tube lengths in straight or U-shaped configuration
- 115 V supply, 24 V controls
- Hinged access to controls from end of the burner box casing
- Design certified for indoor, vented systems in commercial and industrial installations
- Available Accessories:
  - Chain mounting sets
  - Thermostat
  - Flexible, stainless steel gas connection
  - Pressure regulator
  - Wall and roof combustion air caps
  - Wall and roof vent caps
  - Aluminum reflector extension



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

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## GENERAL UNIT APPLICATIONS

### Infrared Heating Systems Defined

Infrared heating systems rely upon the transfer of radiant energy from hot heat exchanger surfaces (up to 1000°F for low 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.

Infrared heating systems can serve three basic functions:

- Total building heating - The infrared heaters are used to heat the entire building. The system is designed to heat the floor, which, in turn, creates convection currents that heat the air above it.
- Partial building heating - The infrared heaters are used to heat sections of a building such as an assembly line or an office section located in an open area of a warehouse.
- Spot heating - The infrared heaters are used for heating only small areas, such as a loading dock or a single-person work cell. When low-intensity infrared heating is required, usually a U-tube system is specified in order to concentrate the heat.

### Advantages of Infrared Heating

- There is no air mover. This reduces electricity and maintenance costs, and also results in better worker comfort, since there are no uncomfortable drafts or annoying fan noise.
- Temperature recovery is quick if cold air is introduced from open doors or windows. A conventional warm air system must first heat the cold air, which then heats the objects in the space. In contrast, an infrared system supplies immediate heat to the surfaces in the space.
- Zone heat control is easy with infrared heating, due to its ability to efficiently heat small areas.
- There can be a significant energy cost savings in spot heating applications. If only a small section of a large, open building requires heat, a conventional warm air system must heat and deliver a large volume of air. This is especially significant in a building with high ceilings, where the warm air will tend to collect. Infrared heaters will more efficiently heat only the surfaces required, at lower thermostat settings.

### Example of typical heat distribution in a building:

Infrared heating	Conventional heating
40°F	90°F
50°F	80°F
65°F	70°F

### Typical Applications

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

- Manufacturing facilities
- Vehicle repair centers
- Warehouses and indoor loading docks
- Aircraft hangars
- Indoor Tennis courts
- Emergency vehicle garages
- Vestibules

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

Figure 3.1 - Construction Features



### Features

1. Polished aluminum reflectors
2. Durable polyester-powder paint
3. Permanently-lubricated combustion blower motor
4. Flame observation window on underside of combustion chamber
5. Burner on light on underside of unit.
6. Pressure switch closure light on underside of unit
7. Three-trial, hot surface ignition (single trial on multiple burner systems).
8. CSA design certification
9. Pre Engineered multiple burner layouts

### Benefits

1. Direct radiant heat from the tubes to the desired area, for increased comfort over wider areas.
2. Maintains long-life new appearance.
3. Reduces maintenance.
4. Provides a convenient visual check of unit operation from ground level.
5. Indicates burner operation.
6. Indicates that the combustion blower is operating.
7. Provides reliable ignition.
8. Assures that the unit conforms to national safety standards.
9. Provides installation flexibility - up to 4 burners with only 1 building penetration.

Figure 4.1 - Straight and U-Tube Configurations

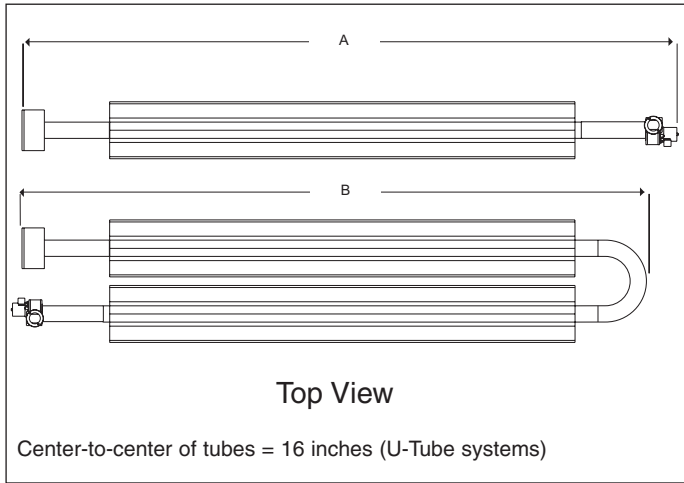


Table 4.1 - Single Burner System Dimensions

Btu/hr Input	Tube Length(s), (ft.)	Straight Tube System Dimension "A"(ft.)	U-Tube System Dimension "B"(ft.)
75,000	20, 30, 40, 50	23, 33, 43, 53	13, 18, 23, 28
100,000	30, 40, 50	33, 43, 53	18, 23, 28
125,000	40, 50, 60	43, 53, 63	23, 28, 33
150,000	40, 50, 60	43, 53, 63	23, 28, 33

Table 4.2 Shipping Weights - Single Burner System

All Burners Tube Length	34 lb.	
	Straight	U-Tube
20'	78 lb.	89 lb.
30'	112 lb.	132 lb.
40'	146 lb.	157 lb.
50'	180 lb.	200 lb.
60'	214 lb.	225 lb.

Figure 4.2 Casing Dimensions - Burner Box

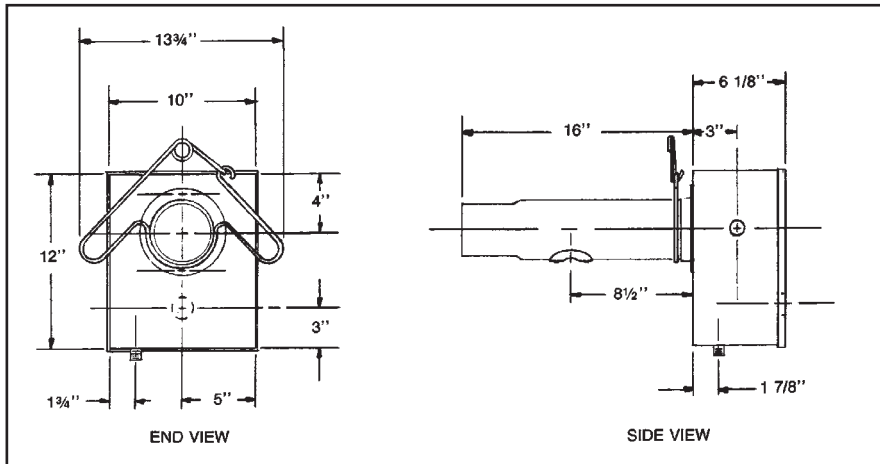


Table 4.2 - Utilities - Single Burner Systems

Electrical Rating	Gas Connection (inch)	Minimum Gas Inlet Pressure (" W.C.)	Maximum Gas Inlet Pressure (" W.C.)	Manifold Gas Pressure (" W.C.)	Flue Connection (inch)	Tube Diameter (inch)
120V/60Hz/1Ph 4.8 AMP starting 1.1 AMP operating	1/2 NPT	6.0 (natural gas)	14.0 (natural gas)	5.0 (natural gas)	4 (O.D.)	4 (O.D.)

Figure 4.3 Combustible Material Clearances

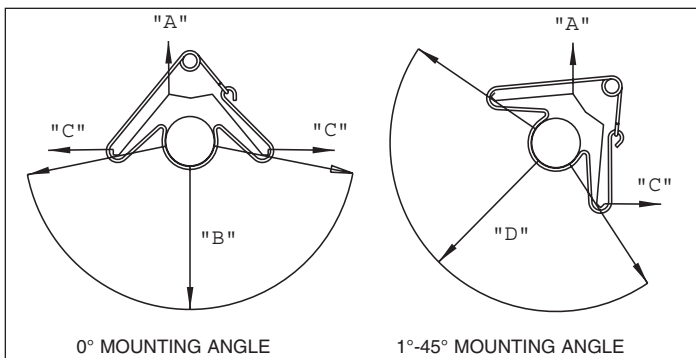
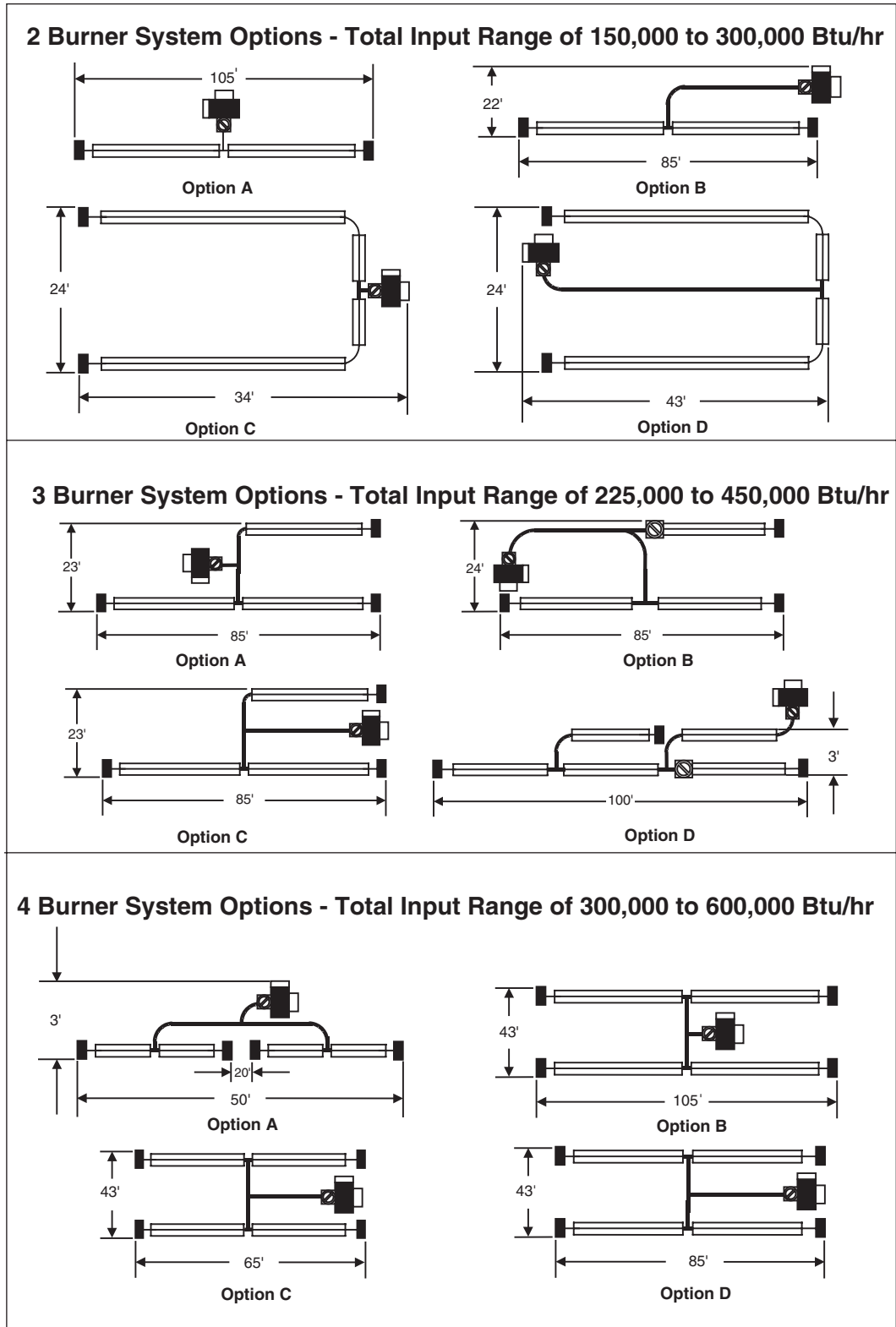


Table 4.3 - Combustible Materials Clearances

Model No.	Minimum Clearances to Combustible Materials (Inches)			
	Top "A"	Bottom "B"	Side "C"	Front "D"
MV 75/100	9	66	36	66
MV125	12	72	36	72
MV150	12	112	42	112

**Figure 5.1**  
**Multiple Burner Layouts - Model MVM ①②**



- ① Layouts are pre-engineered, packaged, and certified for installation as shown. Alternate layouts not available. Drawings not to scale.
- ② See page 6 for system component listing and performance data

**Legend**

	Radiant tube with reflector		Non-radiant tube
	90° tube elbow		Damper
	4" x 4" x 4" tube tee or wye		Burner
	Vacuum pump		

**Table 6.1  
Components in Multiple Burner Systems**

Number of Burners: Configuration Option:	Number of Component Parts in System											
	2				3				4			
	A	B	C	D	A	B	C	D	A	B	C	D
<b>Burners</b>	2	2	2	2	3	3	3	3	4	4	4	4
<b>Vacuum Pump</b>	1	1	1	1	1	1	1	1	1	1	1	1
<b>Control Panel</b>	1	1	1	1	1	1	1	1	1	1	1	1
<b>10' Tubes</b>	10	14	8	14	14	18	18	15	24	24	19	24
<b>10' Reflectors</b>	10	8	8	10	12	12	12	15	12	20	12	16
<b>90° Elbow</b>	0	1	2	3	1	2	2	3	2	0	0	0
<b>4" x 4" x 4" Y Tube</b>	1	1	1	1	2	1	2	0	3	3	3	3
<b>4" x 4" x 4" Right Angle Tube</b>	0	0	0	0	0	1	0	2	0	0	0	0
<b>Tube and Reflector Hangers</b>	13	18	13	16	17	23	24	20	28	32	26	32
<b>Tube Clamps</b>	12	19	13	20	20	23	25	22	32	31	27	31
<b>4" Silicone Rubber Boot</b>	1	1	1	1	1	1	1	1	1	1	1	1
<b>Air Metering Damper</b>	1	1	1	1	1	2	1	2	1	1	1	1

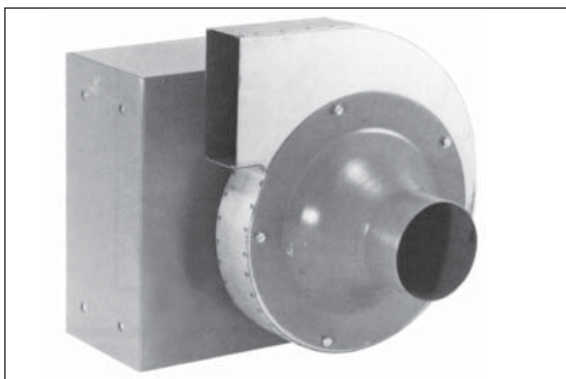
**Table 6.2  
Multiple Burner System Ratings, Mounting Height and Clearance to Combustibles**

Model No.	Number of Burners	Btu/hr Input	Recommended Mounting Height (Ft.)	Clearance to Combustibles (Inches)		
				Top	Bottom	Side
MVM 75	2	150,000	12 - 14	9	66	36
	3	225,000				
	4	300,000				
MVM100	2	200,000	12 - 14	9	66	36
	3	300,000				
	4	400,000				
MVM125	2	250,000	15 - 22	12	72	36
	3	375,000				
	4	500,000				
MVM150	2	300,000	15 - 22	12	112	42
	3	450,000				
	4	600,000				

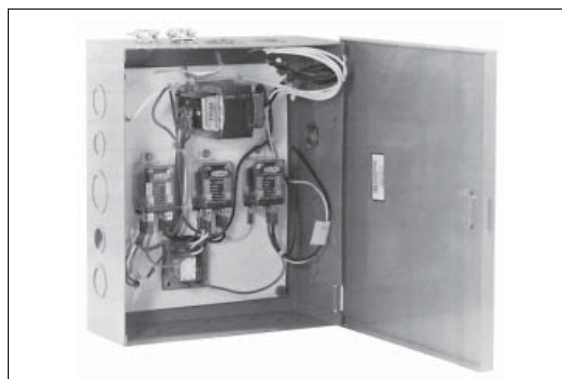
**Table 6.3  
Utilities - Multiple Burner Systems**

Model	Electrical Ratings 115 Volts 60 Hertz			Minimum Inlet Pressure ("W.C.)	Maximum Inlet Pressure ("W.C.)	Manifold Pressure ("W.C.)
	Burners	Starting Amps	Running Amps			
MVM	2	16	7.8	Natural	Natural	Natural
	3	21	8.7	6.0	14.0	5.0
	4	25	9.6	6.0	14.0	5.0

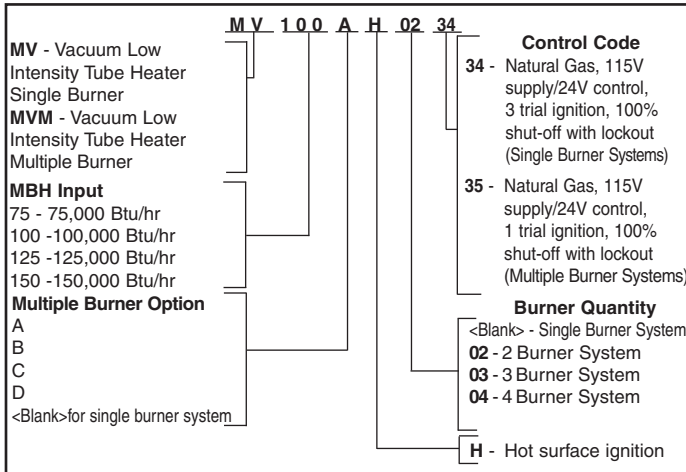
**Figure 6.1 - Multiple Burner System Vacuum Pump**



**Figure 6.2 - Multiple Burner System Control Box**



**Figure 7.1**  
**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 installations. Infrared heater(s) shall have CSA (Canadian Standards Association) 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 16 gauge cold rolled 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 input of 150,000 Btuh shall be 16 gauge 4" O. D. titanium aluminized 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 three-trial, 100% shut-off hot surface ignition control system (single trial on multiple burner systems). 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 combustion air blower. All controls shall be rated for a maximum inlet pressure of 1/2 PSI gas pressure.

Multiple burner systems will have a control box to perform pre-purge and post-purge timings at each heating cycle. The control panel includes relays for zone control through multiple thermostats (not included)

Controls shall be designed for natural gas having a specific gravity of \_\_\_\_\_, a Btu content of \_\_\_\_\_ Btu/ft<sup>3</sup> at \_\_\_\_\_ feet elevation.

## Motor

Each single burner system 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.

For multiple burner systems, the motor shall be 1/3 HP, 115v, 60 Hz, single phase with an operating speed of 3450 RPM.

The Modine brand has been the industry standard since Arthur B. Modine invented and patented the first lightweight, suspended hydronic unit heater in 1923.

No other manufacturer can provide the combined application flexibility, technical expertise and fast delivery found at Modine.

Consult your local Modine distributor for help in solving your indoor air problems.

## INDOOR AIR SOLUTIONS

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

- Gas-fired unit heaters
- Gas-fired duct furnaces
- Gas-fired high-intensity infrared heaters
- Gas-fired low-intensity infrared heaters
- Steam/hot water unit heaters
- Steam/hot water cabinet unit heaters
- Steam/hot water commercial fin tube radiation
- Oil-fired unit heaters
- Electric unit heaters
- Indoor gravity vented single and multiple duct furnace make-up air units
- Indoor separated combustion single and multiple duct furnace make-up air units
- Outdoor single and multiple duct furnace make-up air units
- Direct-fired make-up air units

With burner capacities up to 7,862,000 Btu/hr and air-handling capacities as high as 60,000 CFM, Modine products are compatible with every fuel type, including:

- **Natural or Propane Gas** • **Steam/Hot Water** • **Oil** • **Electric**

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

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