

## *Gas-Fired Unit Heaters*



### *A Guide to Greenhouse Heating Strategies*



# THE MOST EFFICIENT CHOICE FOR YOU

Total owning and operating cost over the useful life of a unit heater is the yardstick you should use to measure your most efficient choice. Comparing “apples to apples”, Modine gas-fired unit heaters have been the greenhouse market’s proven efficiency leaders for more than 15 years. If you’re offered an initial-purchase price that seems too good to be true, how should you react? Very cautiously.

While the Modine record for high efficiency was being solidly established, several unit heater brands have come and gone. The greenhouse environment and heating demands are too tough for most ordinary gas-fired unit heaters. Only Modine has stood the test of time and developed a range of products that provides the most efficient approach to total owning and operating cost.

Three primary factors contribute to the measurement of total owning and operating costs: acquisition cost or purchase price, the cost of maintenance and repair, and the cost of fuel. See the detailed feature and benefit listing on the back page that will help you separate the best from the rest. Paying more up front for a top-quality product usually results in reduced maintenance and repair cost over time. That is exactly what you can expect from Modine gas-fired unit heaters.

Turning the fuel consumed into useful heat for comfort and maximization of crop production requires substantial application experience. Modine has it. Thermal efficiencies up to 82% and seasonal efficiencies up to 80% give you more growing power for your heating dollar. There’s more to application efficiency than hanging up a unit heater. The Modine sales and service team has the product alternatives and application experience you need to maximize fuel efficiency.

## Low Cost, At A Competitive Price

In deciding which generation of gas-fired unit heaters is best for your application, take the time to investigate total owning and operating cost. Don’t be fooled by a low initial purchase price. The chart to the right compares the thermal efficiency of Modine’s conventional gravity-vented units to high-efficiency power-exhausted units and to the high-efficiency,

separated-combustion, power-exhausted units. Projected fuel efficiencies are based on the climate in three tiers across the United States and Canada: northern, middle and southern. Data is presented in each tier for full-year and partial-year growers.

Each of the six comparisons concludes with a payback period which relates to the higher initial cost of the two power-exhausted alternatives. As you might expect, the paybacks are faster in colder climates and full-year operations. You’ll note the fuel-efficiency cost savings alone are sufficient reason for even southern growers to consider the power-exhausted units.

## High-Efficiency Separated Combustion Beats Harsh Environment – Provides Longevity

The chart clearly shows that the fuel-cost payback for high-efficiency, power-exhausted units is relatively short. While the payback for the separated combustion units is somewhat longer, savings in maintenance and repair costs and longer unit life must also be part of your evaluation. Chlorinated, halogenated, or acid vapors, humidity, and lack of combustion air create problems for heating equipment.

You can enhance your payback with separated-combustion, power-exhausted unit heaters beyond fuel efficiency. Combustion air drawn from outside the greenhouse eliminates concern about an adequate supply of combustion air. Additionally, outside air virtually eliminates any problem caused by chemicals and/or humidity. Also, locating the combination gas control and ignition control in a sealed compartment provides maximum protection for these critical components.

Before purchasing your next unit heater, review this guide to greenhouse efficiency. Involve your Modine sales representative if you have any questions. Analysis of your greenhouse environment and your total owning and operating costs will help you make an informed decision. You are likely to conclude the least costly alternative over years of use requires a higher initial investment. You’ll also find your best alternative is one of the application-matched choices available from Modine.

# EFFICIENCY AND PAYBACK ANALYSIS

	Gravity-Vented	PDP/BDP Power-Exhausted	PSH/BSH Separated-Combustion
<b>GENERAL PARAMETERS</b>			
Cost of Heater	\$812	\$860	\$1,403
Additional Acquisition Cost Compared to Conventional Unit	—	\$48	\$591
Greenhouse Heat Loss	140,000 Btu/Hr	140,000 Btu/Hr	140,000 Btu/Hr
Fuel Cost per Therm (Natural Gas)*	\$1.36	\$1.36	\$1.36
Thermal Efficiency	80%	80%	82%
Seasonal Efficiency	65%	78%	80%
<b>NORTHERN TIER - DETROIT</b>			
<b>Full-Year Grower</b>			
Fuel Saved per Year	—	589 Therms	657 Therms
Fuel Dollars Saved per Year	—	\$801	\$893
Payback Period	—	1.07 Years	1.57 Years
<b>Partial-Year Grower**</b>			
Fuel Saved per Year	—	261 Therms	289 Therms
Fuel Dollars Saved per Year	—	\$355	\$393
Payback Period	—	2.42 Years	3.57 Years
<b>MIDDLE TIER - KANSAS CITY</b>			
<b>Full-Year Grower</b>			
Fuel Saved per Year	—	445 Therms	496 Therms
Fuel Dollars Saved per Year	—	\$606	\$675
Payback Period	—	1.42 Years	2.08 Years
<b>Partial-Year Grower**</b>			
Fuel Saved per Year	—	180 Therms	200 Therms
Fuel Dollars Saved per Year	—	\$244	\$272
Payback Period	—	3.52 Years	5.15 Years
<b>SOUTHERN TIER - DALLAS</b>			
<b>Full-Year Grower</b>			
Fuel Saved per Year	—	223 Therms	249 Therms
Fuel Dollars Saved per Year	—	\$304	\$339
Payback Period	—	2.83 Years	4.14 Years
<b>Partial-Year Grower**</b>			
Fuel Saved per Year	—	81 Therms	90 Therms
Fuel Dollars Saved per Year	—	\$110	\$123
Payback Period	—	7.85 Years	11.40 Years

\* Be sure to base your payback calculations on the type and cost of fuel you use. Propane gas usage ranges from 20% in the West to as high as 90% in Florida. Propane price premiums compared to natural gas range from 15% to more than 125%. The resultant savings for comparable BTU capacity can be more than double those listed, and the payback period can be reduced by more than half.

\*\* Partial-year heating includes the latter part of February, all of March and April, and the first part of May.

NOTES: The above information is provided for comparison purposes only. The factors used to determine savings have been established by Modine. You should base your evaluation on actual acquisition costs, fuel costs, outdoor temperatures, heating requirements and other variables for your specific application.

# RESPONDING TO YOUR NEEDS AND RECOMMENDATIONS

Compare the following list of Modine benefits and performance attributes to any other unit-heater brand you may be considering. Only Modine gives you the clear advantages of advanced engineering, heavy-gauge materials, top-quality components and thousands of satisfied customers. See for yourself. The extra value built into every Modine unit heater is backed by years of experience. While others have come and gone, Modine has been a consistent source of top-quality products and reliable service. Our commitment to serving the needs of the greenhouse market is stronger than ever. For you, that means Modine unit-heaters are the most cost-efficient choice for your bottom line.

## Standard Quality Items

- 80% thermal efficiency
- 45-50 degree temperature rise
- 20-gauge heat exchangers
- Totally enclosed motors
- Easy-to-use 6-point terminal wiring board
- Line voltage in conduit for safety
- Epoxy-coated, ignition-control contacts protected from moisture
- Field-adjustable level-hanging feature
- Rounded corners to avoid cuts
- Die-formed corners for a quieter unit
- Hinged bottom pan for ease of service
- High-quality polyester powder paint holds up in greenhouses
- Vibration isolators eliminate transmission of fan noise
- 360 degree fan guard for safety
- Die-formed fan venturi for quiet operation and proper air flow
- Fast shipment from back-up factory inventory
- Full line of accessories available
- CSA certified
- Optional standing pilot (PDP/BDP)
- Wing screws on bottom pan make it easier to lower
- Common replacement part numbers on serial plates
- Bar coded
- Larger carton labels



PD Gravity-Vented



BD Gravity-Vented



PDP Power-Exhausted



BDP Power-Exhausted



PSH  
Separated-Combustion



BSH  
Separated-Combustion

For complete details on Modine's line of gas-fired unit heaters for the greenhouse market, contact your distributor. Information on Modine's steam and hot water, electric, and oil-fired unit heaters is also available. In addition, Modine offers a complete line of gas-fired heating and ventilating systems. Whatever your greenhouse heating and ventilating need, you can rely on Modine to have an alternative with the best efficiency for your bottom line.

## Advantages of Power-Vented (PDP/BDP) over Gravity-Vented

- Seasonal efficiency of 78% vs 65%
- Smaller vent sizes
- Sidewall venting
- Normally has shorter vent runs
- No blocked vent switch assures efficient operation in very tight greenhouses
- Horizontal sidewall vent makes installation easy and cost efficient
- 100% shut-off, continuous retry ignition allows for certified field conversion to propane

## Advantages of Separated-Combustion (PSH/BSH) over Power-Vented (PDP/BDP) and Gravity-Vented

- Higher efficiency (secondary heat exchanger) - 82% vs 80%
- Use of outside air provides longer heat exchanger life
- Eliminates premature heat exchanger failure due to the use of clean combustion air
- Does not compete with plants for in-house oxygen
- No allowances for fresh air required - allowing grower to button house during the night
- Chemicals do not enter into combustion process

## Application and After-Sale Support

- Experienced sales representatives in 90 offices serving local markets across North America
- System specification and design
- Assistance with application engineering and cost analysis
- Product and installation literature
- Product training
- Parts and service support
- On-going commitment to greenhouse market



### Commercial HVAC&R Division Modine Manufacturing Company

1500 DeKoven Avenue  
Racine, Wisconsin 53403-2552

Phone: 1.800.828.4328 (HEAT)

Fax: 1.800.204.6011

[www.modine.com](http://www.modine.com)

© Modine Manufacturing Company  
2005 C11/05 - 2.5M Litho in USA