BRUEST® HOTCAT

Natural Gas Line Heaters

Green, Safe, Clean Heating

BRUEST
CATALYTIC HEATERS

www.bruestcatalyticheaters.com

Bruest HOTCAT natural gas line heaters are designed to be safe, clean, and easy to operate. The heat source is provided by Bruest's catalytic heaters that have been used in the natural gas industry for more than 50 years. The catalytic heater panels emits infrared energy to directly heat the heat exchanger without the need for a heat transfer medium. This greatly reduces the cost as well as the complexity of the line heating system. The HOTCATs are offered with either manual (Class 1 Division 1, or Division 2, Group D compliant) or automated control (Class 1 Division 2 Group D compliant) to suit the application demands. With approval for installation in classified locations, the HOTCATs can be installed in hazardous locations to further reduce the installation cost. Bruest HOTCATs provides natural gas line heating safely, cleanly, and easily making them suitable in many applications.

TECHNOLOGY & OPERATION OVERVIEW

Bruest HOTCAT natural gas line heaters uses Bruest's catalytic heater panels as the heat source. The catalytic heater panels convert the fuel gas to CO2, water vapor, and infrared heat with virtually no NOx in the process. The process begins by preheating of the catalyst with electric power. Electric power is required for 20 to 30 minutes per zone during the startup process. Once the catalyst has been preheated, the fuel gas can be introduced to complete the process. The HOTCATs are offered with either manual or automated control system to suit different application requirements.

MANUAL SYSTEMS

Manual HOTCATs are controlled with the included thermostatic control valve. The heater panels are manually started individually or in groups. Power is applied for 20 to 30 minutes before gas is introduced through the safety valve. The number of panels used would depend on the expected operating conditions. Addition or removal of heat panels would need to be done by the operator to match changing conditions. A high temperature shutoff option is available to prevent overheating of the gas during low to zero flow periods.

Example: Manual HOTCAT installation

Example: Automated HOTCAT installation

AUTOMATION CONTROL SYSTEMS

The HOTCAT line heater automation control systems are based on Allen Bradley's Micro850 (available for smaller HOTCATs) or CompactLogix (all sizes) PLC controllers. The control system adds or removes heat by comparing the temperature of the out-put RTD to the setpoint. For tighter control of the gas temperature, a second temperature sensor can be added downstream. All automated HOTCATs require a constant power source to start the heater panels. Ethernet communication is standard for integration of the HOTCAT to the local control system as needed.

HOTCAT VERSUS THE COMPETITION

The HOTCAT natural gas line heater is a direct replacement for small to mid-size water bath heaters. The water bath heater is the traditional heating technology when heating of natural gas is required. The HOTCAT overcomes many of the installation, operation, maintenance, and environmental issues related to the use of water bath heaters.

The HOTCATs can be installed with a smaller foundation due to its lower operational weight as a result of not having to use glycol. This also reduces the operation and maintenance cost because the HOTCATs do not need frequent inspection and addition of glycol and chemical additives. Without a standing pilot, the HOTCATs will not suffer from blown out pilots that require a manual re-start by the operator.

The HOTCATs are environmentally friendly because they emit virtually zero NOx and is nearly silent when operational. Along with the reduced overall height, the HOTCATs lend themselves suitable for not only rural but also urban areas. Inspection of the HOTCATs can be accomplished without the use of heavy equipment or interruption to the gas service by simply opening the stainless steel exterior doors.

The ease of use, lower installation and operational cost, with less, and easier, maintenance makes the HOTCATs an easy choice for natural gas line heating.

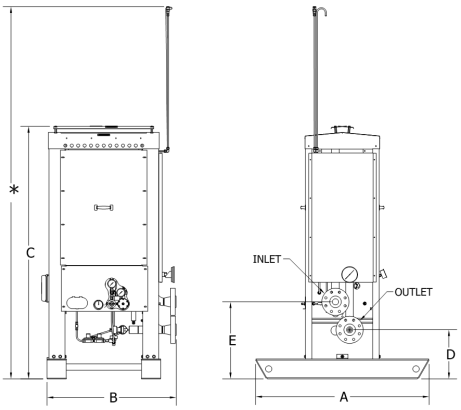
Typical automated HOTCAT installation

Example water bath line heater installation

FEATURE	HOTCAT	WATER BATH	BENEFITS
Material of Construction	Stainless Steel exterior on galvanized steel frame. Carbon Steel heat ex-changer	Carbon Steel Construction	Outdoor installation of HOTCATs will provide years of worry free operation with greater aesthetic appeal
Heat Source	Catalytic Heater Panels without an open flame	Open flame combustion chamber	HOTCAT heater panels can be configured to be installed in Class 1 Division 2 locations, greatly reducing space requirements
Pilots	None required	Need a standing pilot	Without a standing pilot, the HOTCATs do not consume energy when idle and has no risk of a pilot blowout
Environmental Impact	Direct Heating without need of glycol. Virtually zero NOx	Glycol / water mix required with higher levels of NOx	Operation of the HOTCATs requires lower initial and ongoing maintenance costs with low to zero emission of NOx and reduced environmental impact
Installation Location	No Noise with lower overall height	Noisy and requires a tall exhaust stack	HOTCATs can be safely located in populated areas as they have a lower profile and are silent when running.
Multi-Zone Operation	Yes	No	HOTCATs offers built-in “redundancy” as each zone can operate independently of the others.

SPECIFICATIONS

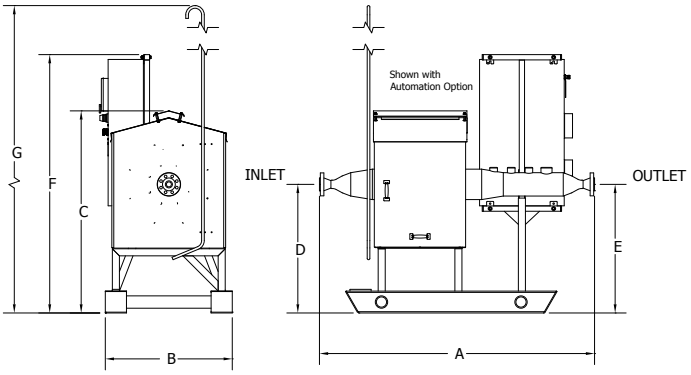
HOTCAT Super Freez-Fiter Series — Expandable line heater for low duty applications



Heater Model	Length	Width	Height	Outlet Flange Height	Inlet Flange Height	Flange Options	Heat Ex-change	Weight	Max Fuel
	A	B	C	D	E				
	in/cm	in/cm	in/cm	in/cm	in/cm			lbs/Kg	BTU
HC28	54.2 / 138	40.25 / 102	66.75 / 170	15.25 / 39	24 / 61	2" 600# / 2" 1500#	(1) Tube Coil	550 / 249	28,800
HC30	54.2 / 138	40.25 / 102	66.75 / 170	15.25 / 39	24 / 61	2" 600# / 2" 1500#	(2) Tube Coil	550 / 249	28,800
HC56	54.2 / 138	40.25 / 102	66.75 / 170	15.25 / 39	24 / 61	2" 600# / 2" 1500#	(2) Tube Coil	590 / 268	57,600
HC86	54.2 / 138	40.25 / 102	66.75 / 170	15.25 / 39	24 / 61	2" 600# / 2" 1500#	(3) Tube Coil	640 / 290	86,400

* Tubing used for relief valves will add 37.5" to overall height

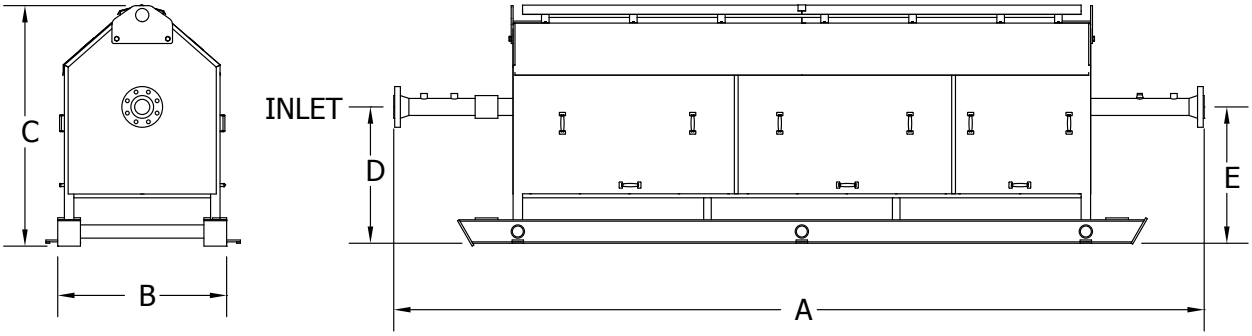
HOTCAT Compact Series — Small foot print line heaters with multiple heat exchanger options



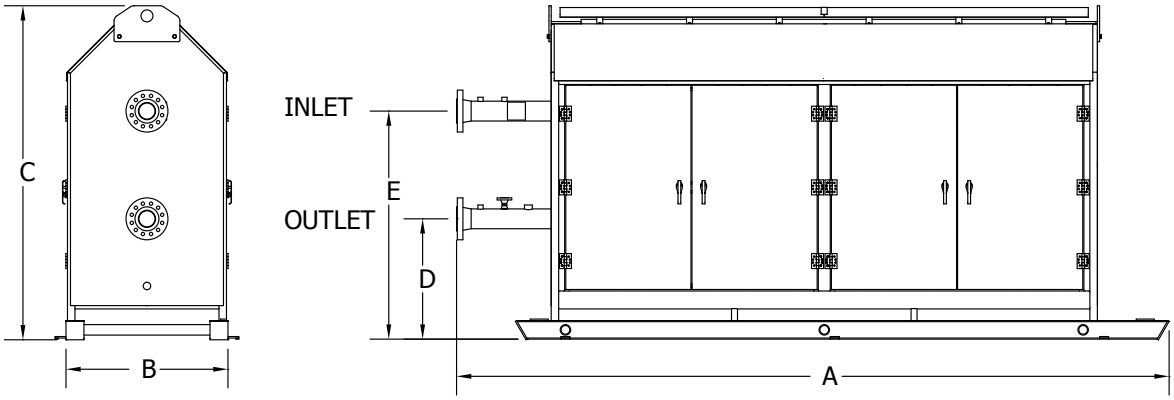
Heater Model	Length	Width	Height	Outlet Flange Height	Inlet Flange Height	Height of Control Panel	Height of Relief	Flange Options	Heat Exchange	Weight	Max Fuel
	A	B	C	D	E	F*	G*				
	in/cm	in/cm	in/cm	in/cm	in/cm	in/cm	in/cm			lbs/Kg	BTU
HC0050	78/198	36/91	57.3/146	36.5/93	36.5/93	NA	NA	2" 600#	Inline Pipe	950/431	57,600
HC0060	84/213	36/91	57.3/146	36.5/93	36.5/93	73.25/186	122/310	2" 600# / 2" 1500#	Coil	980/444	57,600
HC0075	90/229	36/91	57.3/146	36.5/93	36.5/93	73.15/186	122/310	2" 600#	Inline Pipe	1,000/454	86,400
HC0085	96/244	36/91	57.3/146	36.5/93	36.5/93	73.25/186	122/310	2" 600# / 2" 1500#	Coil	1,100/499	86,400
HC0100	102/259	36/91	57.3/146	36.5/93	36.5/93	73.25/186	122/310	2" 600#	Inline Pipe	1,200/544	115,200
HC0110	108/274	36/91	57.3/146	36.5/93	36.5/93	73.25/186	122/310	2" 600# / 2" 1500#	Coil	1,300/590	115,200
HC0125	114/290	36/91	57.3/146	36.5/93	36.5/93	73.25/186	122/310	2" 600#	Inline Pipe	1,400/635	144,000
HC0135	120/305	36/91	57.3/146	36.5/93	36.5/93	73.25/186	122/310	2" 600# / 2" 1500#	Coil	1,500/680	144,000
HC0150	126/320	36/91	57.3/146	36.5/93	36.5/93	73.25/186	122/310	2" 600#	Inline Pipe	1,800/816	172,800
HC0160	132/335	36/91	57.3/146	36.5/93	36.5/93	73.25/186	122/310	2" 600# / 2" 1500#	Coil	1,850/839	172,800
HC0235	108/274	51.5/131	75.5/192	44.5/113	44.5/113	81.5/207	122/310	2" 600# / 2" 1500#	Coil	1,960/889	230,400
HC0360	132/335	51.5/131	75.5/192	44.5/113	44.5/113	81.5/207	122/310	2" 600# / 2" 1500#	Coil	2,000/907	345,600

* Dimensions F and G are applicable only to automated HOTCATs

HOTCATs — Environmentally friendly alternative natural gas line heating



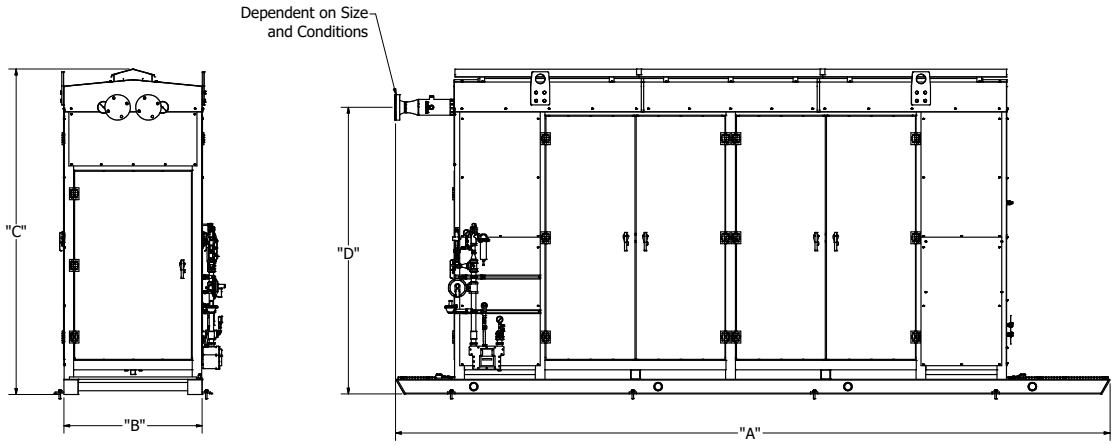
Heater Model	Length	Width	Height	Outlet Flange Height	Inlet Flange Height	Flange Options	Heat Exchange	Weight	Max Fuel
	A	B	C	D	E				
	in/cm	in/cm	in/cm	in/cm	in/cm			lbs/Kg	BTU
HC288	238/605	44.6/113	63/160	36/91	36/91	4" 600# / 4" 900#	Inline Pipe	4,160/1,887	288,000



Heater Model	Length	Width	Height	Outlet Flange Height	Inlet Flange Height	Flange Options	Heat Exchange	Weight	Max Fuel
	A	B	C	D	E				
	in/cm	in/cm	in/cm	in/cm	in/cm			lbs/Kg	BTU
HC350	179/455	54/137	103/262	34/86	70/178	4" 600# / 4" 900#	U-Tube	5,500/2,494	345,600
HC575	238/605	54/137	104/264	34/86	70/178	4" 600# / 4" 900#	U-Tube	7,350/3,333	576,000
HC850	238/605	54/137	112/284	40/102	76/193	6" 600# / 6" 900#	U-Tube	7,500/3,401	864,000
HC1000	258/655	54/137	112/284	40/102	76/193	6" 600# / 6" 900#	U-Tube	9,650/4,376	1,036,800
HC1300	301/765	54/137	112/284	40/102	76/193	6" 600# / 6" 900#	U-Tube	11,800/5,351	1,296,000
HC1500	335/851	54/137	112/284	40/102	75/191	6" 600# / 6" 900#	U-Tube	13,100/5,941	1,555,200
HC1700	305/775	59/150	126/320	34/86	94/239	8" 600# / 8" 900#	W-Tube	15,000/6,803	1,728,000
HC2000	334/850	59/150	126/320	34/90	94/240	8" 600# / 8" 900#	W-Tube	15,500/7,029	2,073,600
HC2800	408/1,036	59/150	126/320	34/86	94/239	8" 600# / 8" 900#	W-Tube	20,000/9,070	2,764,800

HOTCAT HH Series

The HOTCAT HH series was introduced as a part of the continuous improvement process at Bruest. The original HOTCATs surrounded the heat exchanger with a heater panels arranged in a diamond shape. The HH series envelops the heat ex-changer with two walls of heater panels. Furthermore, the heat exchanger design has been changed to use a coil bundle with the natural gas being heated in multiple paths and multiple passes in front of the heater panels. All HH series HOTCATs are available only as automated systems.



Heater Model	Length	Width	Height	Outlet Flange Height	Inlet Flange Height	Flange Options	Heat Exchange	Weight	Max Fuel
	A	B	C	D	E				
	in/cm	in/cm	in/cm	in/cm	in/cm			lbs/Kg	BTU
HH520	201/511	59/150	113/287	96/244	96/244	4" 600# / 6" 600#	Multi-Coil	6,600/2,990	518,400
HH700	201/511	59/150	137/348	120/305	120/305	4" 600# / 6" 600#	Multi-Coil	7,780/3,524	691,200
HH1000	287/729	59/150	113/287	96/244	96/244	4" 600# / 6" 600#	Multi-Coil	9,550/4,326	1,036,800
HH1350	287/729	59/150	137/348	120/305	120/305	4" 600# / 6" 600#	Multi-Coil	14,500/6,569	1,382,400
HH2000	373/947	59/150	137/348	120/305	120/305	4" 600# / 6" 600#	Multi-Coil	16,000/7,248	2,073,600
HH2750	459/1,166	59/150	137/348	120/305	120/305	4" 600# / 6" 600#	Multi-Coil	18,500/8,381	2,764,800
HH3500	556/1412	59/150	137/348	120/305	120/305	4" 600# / 6" 600#	Multi-Coil	29,000/13,138	3,456,000

HOTCAT Selection Guide

HOTCAT selection begins with the calculation for the required duty. The minimum information required include:

- Temperature: Inlet and Outlet or After Regulation temperature
- Pressure: Inlet and After Regulation pressure
- Volume of Gas–provide minimum, average, and maximum conditions if available
- Gas Composition or specific gravity of gas

Bruest application engineers will perform the duty calculation and select the heater based on the required duty. In addition to the required duty, several mechanical factors will also impact the proper selection. Multiple startup power options are available including 12VDC, 120VAC, 240VAC, and 480VAC. The HOTCAT catalytic heater panels operates in zones. When available, the higher voltage option is preferable to help reduce the current draw. Higher volt-age power supply also allows multiple zones to be started simultaneously to reduce the total time required to reach operational conditions.

Consult the factory for proper heater design and selection.

APPLICATIONS

The HOTCAT natural gas line heaters continues Bruest's tradition of offering safe, effective, and clean heating solutions for the natural gas industry. Multiple standard configurations, as well as customizable features, allow the HOTCATs to be matched to the application demands.

Town Border, Gate, Regulation Stations

The manual HOTCATs are perfectly suited for applications when the heaters are to be located in remote locations where utilities are not readily available. The manual HOTCATs, with 12VDC startup, can be started from the vehicle battery. With the onboard temperature controller, the manual HOTCATs will modulate the heat output of the heater panels to reflect the flow conditions. Optional high temperature shut off control can be added to shut off the heater panels to prevent over heating of the gas.

Compressor Stations

The HOTCATs lend themselves to serve as the heaters of choice for compressor stations. Without the need for hazardous chemicals and with virtually zero emissions, the addition of the HOTCATs to compressor stations heating requirements help to eliminate environmental concerns. Furthermore, because the HOTCATs are configured for operation in hazardous rated areas, they can be safely operated around the station to reduce the overall installation foot print. The HOTCATs are suitable for applications where the stations are located near populated areas. The HOTCATs are not only nearly silent and odor free during operation but also have a shorter height than traditional heaters, making them less visible to neighbors.

Fuel Gas Systems

The HOTCATs can be configured on a common skid with multiple regulators and metering options as a complete fuel gas system. Options include dual path regulation with worker monitor configuration, by-pass , and multiple meter choices. The common skid approach allows the HOTCAT fuel gas system to be factory assembled and tested prior to shipping to minimize the field installation tasks.

CNG Let Down Systems

With the abundance of natural gas, Compressed Natural Gas (CNG) is rapidly becoming an alternative fuel source for either interruptible supplies or remotely located locations where natural gas pipeline does not exist yet. CNG is normally delivered under high pressure. The pressure must be regulated down before the CNG can be used. Because the HOTCATs can be configured for Class 1 Division 2 locations, the complete HOTCAT CNG system can be closely located to the CNG supply source to re-duce the overall installation size. With nearly silent operation and virtually zero emissions, the HOTCAT CNG let down system can be operated near populated areas without causing any disturbance to the neighbors.

Custom Heating Solutions

With a team of design engineers and internal 3D modeling capabilities, Bruest can design a heating solution to meet the challenges of today's natural gas industry requirements.

Model	# of Heaters	# of Zones	Heater Size	Heaters/ Zone	Amps per Zone				BTUH Input
					12VDC	120VAC	240VAC	480VAC	
HC-28	2	1	12 X 24	1	37.50	4.16	2.08	1.04	28,800
HC-56	4	1	12 X 24	1	37.50	4.16	2.08	1.04	57,600
HC-86	6	1	12 X 24	1	37.50	4.16	2.08	1.04	86,400
HC-50	4	4	12 X 24	1	30.00	4.16	2.08	1.04	57,600
HC-75	4	4	12 X 36	1	30.00	6.25	3.12	1.56	86,400
HC-100	4	4	12 X 48	1		8.33	4.16	2.08	115,200
HC-125	4	4	12 X 60	1		10.41	5.20	2.60	144,000
HC-150	4	4	12 X 72	1		12.50	6.25	3.12	172,800
HC-288	8	8	12 X 60	1		10.41	5.20	2.60	288,000
HC-0060	4	4	12 X 24	1	30.00	4.16	2.08	1.04	57,600
HC-0085	4	4	12 X 36	1	30.00	6.25	3.12	1.56	86,400
HC-0110	4	4	12 X 48	1		8.33	4.16	2.08	115,200
HC-0135	4	4	12 X 60	1		10.41	5.20	2.60	144,000
HC-0160	4	4	12 X 72	1		12.50	6.25	3.12	172,800
HC-0235	4	4	24 X 48	1		20.82	10.41	5.20	230,400
HC-0360	4	4	24 X 72	1		25.00	12.50	6.25	345,600
HC-0350	8	8	12 X 72	1			6.25	3.12	345,600
HC-0575	16	8	12 X 60	2			10.40	5.20	576,000
HC-0850	16	8	18 X 60	2			15.80	7.88	864,000
HC-1000	16	8	18 X 72	2			19.16	9.56	1,036,800
HC-1300	24	12	18 X 60	2			15.80	7.88	1,296,000
HC-1500	24	12	18 x 72	2			19.16	9.56	1,555,000
HC-1700	24	12	24 X 60	2			20.80	10.40	1,728,000
HC-2000	24	12	24 X 72	2			25.00	12.50	2,073,600
HC-2800	32	16	24 X 72	2			25.00	12.50	2,764,800
HH-0520	6	6	24 X 72	1			12.50	6.25	518,400
HH-0700	8	8	24 X 72	1			12.50	6.25	691,200
HH-1000	12	6	24 X 72	2			25.00	12.50	1,036,800
HH-1350	16	8	24 X 72	2			25.00	12.50	1,296,000
HH-2000	24	8	24 X 72	3				18.75	2,073,600
HH-2750	32	8	24 X 72	4				25.00	2,764,800
HH-3500	40	8	24X72	5				31.25	3,456,000

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