

Quest Power Heat 1.8



Central Hydronic Heater

The Quest Power Heat 1.8 Description:

- The Power Heat 1.8 is a fuel burning appliance, designed to heat fluid “on demand” and provide pumped circulation of the fluid for use in various portable Hydronic applications.
- The Power Heat 1.8 provides a central source of hot “Heat Transfer Fluid” (HTF) for use with dependent heat exchangers such as:
 - * Fan coils for heating and drying of structures.
 - * Multi-circuit line heat exchange hose or tubing for ground thawing, concrete curing, snow melting and slab heating.
 - * Custom Hydronic heat exchange accessories and applications.
- The Power Heat 1.8 is equipped to burn any of the following fuels:
 - * Light diesel fuel or Heating Oil.
 - * Natural Gas or Propane Gas.
- Pumping and Combustion Control are achieved with electrical components. Electrical requirements are:
 - * 120/240 volt, 50 amp, single phase, 4-wire circuit.
- The Power Heat 1.8 is designed for consistently-efficient outdoor operation.

Features:

- The base will contain any spillage, drain-back or leakage of HTF or fuel from within and has built-in fork lift pockets that are accessible from all 4 directions. It is capable of containing about 3 times as much fluid as the total volume of the HTF circuit.
- The combustion chamber/heat-exchange section is a 2-pass, horizontal, helical water tube design.
- The “HTF” circuit includes an open, atmospherically-vented expansion tank, which effectively eliminates the system from Pressure Vessel classification.



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Intertek

Patent Pending



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- The PLC based main operating control provides very precise HTF temperature control and monitoring of safety control functions. Supply and return temperatures of the HTF are continuously displayed as well as supply set point. Faults are displayed on the screen when present.
- The unit comes with a 2-stage multi-fuel burner which can switch from oil to gas with a flip of a switch to accommodate whichever fuel source is connected. Oil connections are provided at the cabinet exterior and the complete gas train with control valves is installed.
- For security and environmental protection, all controls, burner, gas valves, pumps and filters are secured behind access doors.
- All gauges are visible to the operator even when all doors are closed.
- Hose connection couplers for the external HTF circuits are recessed into a sidewall Alcove so as not to create “snag-points” when moving, shipping or delivering the unit. There are 6 pairs of 1” quick-couplers and 1 pair of 2” NPT valves accessible for connection.
- Primary access for operation and service is provided for through doors at the two ends and at the front of the enclosure.

Construction Details:

- The base for the unit is a liquid-tight Enviro-containment tray, constructed from aluminum, with 4-way, integral, fork lift pockets.
- The exterior enclosure panels are made of stainless steel with #4 finish.
- The framework for the enclosure is built of structural aluminum.
- Access panels and the roof are fastener-attached for potential removal.
- The HTF filling and expansion tank is constructed from aluminum.
- The central component of the combustion chamber / heat exchanger consists of two layers of helically coiled steel tubing, oriented horizontally, that create two parallel-connected circuits with HTF flowing through them. A uniquely shaped refractory flue-gas roller and specially-sized containment shroud direct the flow of flue gasses to make 2-passes of turbulent flow over the helical tubing and enhance the heat exchange efficiency.
- The sealed plenum box-enclosure around the heat exchanger consists of flat stainless steel panels. The bottom panel forms a water-tight tray which will collect any condensate that may form under certain operating conditions. A tube connected to a bottom-bung will drain away any condensate that may collect.
- The exhaust flue for the burner exits through the roof of the enclosure. The exposed roof flashing is made from aluminum. The rain cap and Flue pipe are made of stainless steel.



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Dimensions and Capacities:

Length of Cabinet	inches	94
Width of Cabinet	inches	46
Height of Cabinet	inches	54
Height to Top of Rain Cap	inches	84
Heat Transfer Fluid Capacity	US gallons	30
Weight: without heat transfer fluid	pounds	1,861
Weight: with heat transfer fluid	pounds	2,001

Multi-fuel Burner and Fuel Specifications:

- The Burner is manufactured by Riello Burners, Model RLS-50. It is a power, in-shot, forced-draft type with direct spark ignition.
- The burner can switch between oil or gas fuel with the flip of a single switch.
- In either fuel mode it operates in 2-stage format. Hi/Lo/Hi/Lo/.../Off.

Oil Burning Features:

- #1 or #2 light heating oil or diesel fuel may be used.
- In the oil burning mode, the integral fuel pump delivers oil at high pressure to 2 nozzles where pressure-atomization takes place.
- There are 2 in-line solenoid valves, one in-line with each nozzle. These valves determine Low fire (1 nozzle delivering), or High fire (2 nozzles delivering).
- A gauge is connected to a pressure-tap port on the fuel pump of the burner to aid in setting the burner and monitoring performance.
- A Fuel Filter is mounted inside the cabinet, upstream of the burner pump inlet port.
- Supply and return fuel lines terminate at a recessed alcove on the exterior wall of the cabinet and are equipped with quick couplers for ease of connection to a large user supplied fuel tank.



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Oil Mode Burner Specifications:

Riello Burner Model		RLS-50
Operational Mode	2-stage	Hi/Lo/Hi/Lo/.../Off
Electrical Characteristics - Fan Motor	V-A-Hz-Ph	230-4.9-60-1
Electrical Characteristics - Pump motor	V-A-Hz-Ph	120-0.8-60-1
Electrical Power Consumption	Watts Max.	1223
Nozzles: Delavan, 2 required	Low fire = 3.5-60°B	High fire = 5.5-60°B
Fuel Pump Pressure	PSI	200
Fuel Input Rate: on High fire	USGPH	13.26
Heat Input: based on 140,000 Btu per USG	Btu/H	1,856,400
Heat Output: @ 86% net efficiency	Btu/H	1,596,504

Gas Burning Features:

- The UL/CSD1 approved gas train is installed on all units. It is completely wired and extends through the roof panel of the cabinet with a manual shutoff valve on the outside.
- The same gas train is used for either natural gas or propane gas supply.
- To switch the burner from Natural Gas to Propane gas and back again, all that is necessary is to switch-out 6 orifices located in the burner head (both sets of orifices come with the system). It may also be necessary to add a special stepdown pressure regulator to the external gas piping entry point, if the gas delivery pressure is higher than the required range. This must be determined by your local, licensed gas contractor performing the setup. Any exterior regulator required will be supplied by the licensed gas contractor.
- The gas burner utilizes orifice size and gas manifold pressure adjustments to achieve correct natural gas or propane gas inputs.
- Two gauges are mounted to pressure-tap ports on the gas train for use in setting the burner and monitoring performance.
- Verification of gas input should be done by clocking the gas meter.

CAUTION: It is always necessary to comply with the Gas Permit and Inspection process as required by the local authority having jurisdiction. All Natural Gas and LP Gas connections and service setups must be performed by a trained, licensed gas technician!



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Gas Mode Burner Specifications:

Riello Burner Model		RLS-50	
Operational Mode	2-stage	Hi/Lo/Hi/Lo/.../Off	
Electrical - Fan Motor	V-A-Hz-Ph	230-4.9-60-1	
Electrical Power Consumption	Watts Max.	1127	
		Nat. Gas	LP Gas
Min. Gas Supply Pressure	"WC (Kpa)	8" W.C. (1.99 Kpa)	8" W.C. (1.99 Kpa)
Max. Gas Supply Pressure	"WC (Kpa)	12" W.C. (2.98 Kpa)	12" W.C. (2.98 Kpa)
Gas Manifold Pressure - ΔP	"WC (Kpa)	4.61" W.C. (1.15 Kpa)	4.61" W.C. (1.15 Kpa)
Heat Input	Btu/H	1,856,000 Btuh (544 Kwh)	1,800,000 Btuh (527 Kwh)
Heat Output: @ 86% net efficiency	Btu/H	1,596,160 Btuh (468 Kwh)	1,548,000 Btuh (454 Kwh)

Heat Transfer Fluid Distribution:

- The External HTF distribution circuit is comprised of 6 pairs of 1" EPDM hoses and Brass hydraulic-style quick coupler connections. Optional external manifolds are constructed of non-corrosive materials.
- The internal HTF plumbing circuitry is assembled from non-corrosive fittings (brass, plated steel, stainless steel or aluminum) and (EPDM) hoses. 6 pairs of 1" quick couplers and 1 pair of 2" ball valves are accessible externally for connection to a variety of accessories.
- The Power Heat 1.8 has a built-in circulating pump. The 3-phase pump motor is speed-controlled by a "Variable Frequency Device" located in the control panel. This allows the operator to select a slower pumping speed for smaller jobs that require significantly less heat. For full load projects, the pump will be run at full speed.
- An HTF filter Y-strainer is located at the fluid outlet of the pump. It can be isolated for cleaning without drain-down, by closing all the valves on both sides of it.
- The supply HTF temperature sensor and the return HTF temperature sensor are strategically located in thermo-wells within the Internal HTF plumbing circuit.
- 2 High Temperature Limit controls are mounted in a specific location of the internal HTF plumbing circuit to provide safe-mode shut down of the burner if the primary Operator has failed to cycle the burner off before the HTF temperature reaches an unsafe high level. These are mechanical-electric controls that break the circuit when set point is reached. One is an automatic re-set type and will be set 5° higher than the Operator. The second one is a manual-reset type, which will be set 10° higher than the Operator. If tripped, this control requires manual-reset.
- An atmospherically vented HTF reservoir is located high inside the cabinet enclosure to provide for expansion in the HTF circuit and a manual fill point for adding HTF.
 - * It is constructed from non-corrosive aluminum.
 - * It is equipped with a vertical-float gauge that is visible from outside the enclosure.



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- * A Low-water cut-off switch is mounted near the bottom of this tank to provide safe mode shut off of the burner if the level of HTF becomes critically low. This is an electric, probe-type control.
- A combination of isolating valves and short length of suction hose provides the ability to fill the system or top-up with HTF from a drum or bucket, utilizing the HTF circulation pump.
- The HTF circulation pump is stainless steel, direct drive centrifugal type.
 - * The pump is located inside the enclosure at the opposite end to the burner.
 - * Pump ON, OFF and speed control is initiated at the PLC control panel.
 - * A panel-mounted pressure gauge is connected to the output side of the HTF pump by means of a 1/8" ID hydraulic hose and fittings.

Pump Specifications:

Goulds Pump Model		3ST1H5A4
Impeller Diameter	inches	4.75
Motor Horsepower	HP	3
Electrical Characteristics	V-Ph-Hz	130-3-60
Full Load Amp Rating	FLA	7.8
System Design Flow Rate	US GPM	75
System Design Operating Pressure	PSI	30 to 45

Complete System Electrical Requirements:

Supply Voltage	Volts	120/240
Circuit Full Load Amperage	FLA	29.5
Hertz	HZ	60
Phase	PH	single
Control Circuit Voltage	Volts	120
Power Inlet - male NEMA twistlock	50 Amp Rating	

Controls and Electrical:

- A cULus approved electrical control panel is located inside the cabinet enclosure, on the front (upper left corner). It houses specific electrical components and serves as a junction box for cords going to and from remote electrical components.
- All internal electrical wires, terminal strips and all electrical cords exiting this control panel are part of the pre-wired unit. All are supplied by (and certified to UL and CSA standards by) the manufacturer of the control panel assembly.



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- Significant components that are housed inside the unit are part of the CSA/UL approved control panel assembly include:
 - * The Main System power ON-OFF switch.
 - * Circuit breakers for the pump and burner supply power lines.
 - * A thermostatically-controlled cooling fan to cool the panel. A power transformer.
 - * A "Variable Frequency Device" that converts single phase power supply to 3 phase for the pump motor and controls its speed.
 - * A "Programmable Logic Controller".

The PLC Device:

- Operation of the overall system is monitored and controlled by a PLC electronic device. The LCD screen of this device is visible from the exterior of the Power Heat 1.8 through a clear window in the panel access door.
- Inputs to the PLC are received from:
 - * An RTD that senses HTF supply temperature.
 - * An RTD that senses HTF return temperature.
 - * A Low Water Cutoff control that senses HTF level in the expansion tank.
 - * A paddle-type flow switch that senses whether HTF is flowing through the chamber or not.
 - * An automatic-reset high temperature limit switch and a manual-reset high temperature limit switch, that sense the temperature of HTF as it exits the combustion heat exchanger.
 - * A high pressure limit switch that senses combustion chamber pressure.
- While the system is powered-up the PLC screen displays status of the following functions:
 - * Power Supply tolerance range - OK or ALARM.
 - * HTF level – OK or ALARM.
 - * Flow – OK or ALARM.
 - * Glycol pump – ON or OFF.
 - * Heat – ON or OFF.
 - * Burner Firing Stage – LOW or HIGH.
 - * Glycol Supply Temperature.
 - * Glycol Return Temperature.
 - * Glycol Supply Temperature Set point.
- The following adjustments are easily made on the screen touch-pad, with no internal programming required:
 - * Glycol pump START or STOP.
 - * Burner heating circuit START or STOP.
 - * Temperature Set Point adjust UP or DOWN.
- Any other parameter changes require internal programming.



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