

# **SIoux® WATER HEATERS**



**Hybrid Water Heater**

**PWP-1000**



**Water Heater M-1**



# Sioux Industrial Water Heaters

Sioux has been the number one supplier of water heaters to the concrete industry since the 1960s. Sioux offers standard units for any size operation ranging from 415,000 BTUs to 6,000,000 BTUs. Every heater is built to ASME Code, National Board registered, and built to last. These units are designed and built specifically for use in the concrete industry, with continual improvements made each year, providing the features and reliability you need.

## Water Heater Quick Selection Guide

APPLICATION	RATINGS OF HEATER	MODEL	PAGE
Large ready mix concrete plant (typically over 100 yards per hour w/customer supplied hot water storage tank)	3 or 6 M BTU/Hr	Hybrid	8
Small to medium ready mix concrete plant, heater only (typically under 100 yards per hour and used with customer-owned hot water storage tank)	1 to 3 M BTU/Hr	M-1	3
Small to medium ready mix concrete plant, heater with hot water storage tank (typically under 100 yards per hour)	1 to 3 M BTU/Hr	HWP	4
Precast concrete plant	1 M BTU/Hr	PWP	4
Water heater for volumetric mixer truck	415,000 BTU/Hr	M-415	7

## Features and Benefits of Coil-Type Heaters

Sioux Water Heaters provide an instant and continuous supply of hot water. Operation is simple: water at 50-100 PSI (3.45-6.9 BAR) is run through a heating coil, which is heated by an oil or gas burner. The heater can produce up to a 100°F (37.7°C) temperature rise within one minute of startup. Outlet temperature and flow rate can be held at precise levels. Sioux Water Heaters feature heavy-duty steel construction.

- **Easy conversion from NG to LP, or LP to NG** in less than five minutes and at no added cost. All oil and gas models use identical frames, heating coils, electrical pumps, skids etc. This feature allows the customer to change to the lowest-cost fuel, and move the heater to another location where another fuel may be available.
- **Insulation** beneath the external steel jacket provides higher heater efficiency, reducing fuel consumption. Low temperature of steel outer jacket provides a higher safety level.
- **Dual thermometers and pressure gauges** provide indication of inlet and discharge water temperature and pressure, which is useful during operation and maintenance.
- **Flanged disconnects** allow customer to easily replace the heating coil and gas burner.
- **Ball valves** allow easier delimiting of the unit.
- **Low flow indicator** alerts customer of low water flow conditions.
- **Modular Units** allow a minimal investment to start, with the option to expand your system as your operation grows.
- **Exhaust gas** is separate from heated water, to produce non-contaminated hot water.
- **Ease of maintenance**  
Simple and complete draining of coil lowers maintenance costs, reducing down time. Draining reduces risk of damage due to freezing temperatures and minimizes corrosion, increasing coil life.  
Coil replacement is easier and less expensive than replacing the heat exchanger in other types of water heaters.
- **Optimum combustion chamber** provides high efficiency, a clean burn, and low emissions.
- **Three-Pass Coil Design** is superior to alternative heat transfer methods, giving simple, long-lasting performance which reduces fuel consumption, saving the customer money.
- **Meets Section IV of the ASME code** for hot water boilers, third-party inspected to insure compliance.
- **Ease of installation**  
A service-rated disconnect is provided on each M, HWP, PWP heater, eliminating the need to add another disconnect switch as required by the National Electrical Code. Increases safety and lowers installation cost.  
Pre-plumbed and pre-wired, installation is easy. Just connect the water heater to required utilities and you're ready to go.

One day installation and set-up vs. as long as one to two weeks for alternative equipment.

Small footprint – using as little as 3' x 6' (91.44cm x 182.88mm) floor space.

Lower exhaust temperature of approximately 350°F (176°C), may allow using a single wall chimney vs. double wall chimney, lowering chimney installation cost, (check local codes).

- **Instantaneous and continuous** supply of hot water within one minute of start up vs. up to three hours with other systems.
- **Stainless steel condensate collection pan** prevents corrosion from condensate in exhaust gases from rusting the heater.
- **High-quality power gas burner** contains flame within combustion chamber, so performance does not vary with the weather. This design is ideal for high altitude installations.
- **Power gas burner and gas train** are UL Listed, and are built to ASME CSD-1 code.
- **Standard pump and motor** is a seven stage, stainless steel centrifugal pump with stainless steel impellers, stainless steel housing, cast iron flanges and comes standard with a 3 HP motor. Pump life is increased due to strong corrosion resistant stainless steel. This seven-stage pump can handle water at higher temperatures, provides 37% higher water flow through the heating coil, and overcomes much higher friction losses in your piping system. This reduces the temperature rise in the heater, increasing the attainable tank temperature, and reaching the desired tank temperature much faster. This also reduces burner cycling, increasing burner life. Higher flow reduces chance of low-flow shutdown, even with minor liming in the system.
- **Adjustable digital temperature control system** that monitors and controls water storage tank temperature while in recirculation mode.
- **Application flexibility.** Can be run as either a once-through heater, with discharge temperatures up to 195°F (90.5°C), or can be used in a storage tank system where temperatures up to 190°F can be achieved. This meets the needs of a larger number of customers and applications.

Wide range of options are available, such as the configuration types D, M, HWP and PWP, fuel types of NG, LP or oil. Can be designed for almost every customer voltage. Sioux can provide the best unit for your application.



# M Series: Water Heater with Circulation Pump

The M Series is the most common water heater in the ready mix concrete industry and has been the largest seller from Sioux for 40 years.

The M Series is a very reliable water heater that incorporates a high quality centrifugal pump for recirculating hot water to the customer's holding tank. This system is designed for applications where there is a need for a large quantity of water in a short time period. Using your vented water tank (not included), water is circulated by the pump through the heater and back into the tank, achieving the desired water temperature.

Standard construction features include: Indicator light to alert operator if low water flow limit switch has shut down burner due to inadequate water flow. The temperature control switch and the manual reset high temperature limit switch shut off burner in case of excessive water discharge temperature. ASME-rated pressure relief valve opens to discharge water in case of excessive pressure buildup. Pressure gauges and bi-metal thermometers on both inlet and outlet indicate incoming and outgoing water temperature and pressure. Y-strainer on water inlet ensures foreign particles do not enter heater water. Standard BTU ratings are 1,000,000-3,000,000. Standard primary electricals are 230V/3Ph/60Hz, 460V/3Ph/60Hz, 380V/3Ph/50Hz, 575V/3Ph/60Hz, and 230V/1Ph/60Hz.

The entire system is mounted on a rugged steel skid.

- Available in Oil, LP, Natural Gas or Combination.
- Alternate Electricals Available.
- Custom Designs Available.

## Sioux Model M-2

- Oil Fired with Seven-Stage Pumps
- 2,000,000 BTU



## Sioux Model M-1

- Oil Fired with Seven-Stage Pump
- 1,000,000 BTU



# D Series: Water Heaters

The D Series is the most simple and compact of any water heater Sioux manufactures. The D Series incorporates the same basic unit as the M Series but without the centrifugal pump. The D Series is sometimes used for smaller volumes of water. However, a minimum water pressure of 60 PSI (4.14 BAR) is required to operate the system properly. If inlet pressure drops below 60 PSI (4.14 BAR), approximately 12 gal/min water flow, the burner will shut off to prevent damage to the heater. For this reason the M Series is more commonly used for ready mix concrete applications. Standard BTU ratings are 1,000,000-3,000,000. Standard primary electricals are 115V/1Ph/60Hz and 220V/1Ph/50Hz.

## Basic Water Heater

- Gas Fired
- Sioux Model D-1000



# HWP Series (Hot Water Plant)

The HWP was designed to provide heater and storage tank for small to medium size ready mix concrete plants. The HWP is also ideal for construction sites, such as dams or bridges.

The HWP Series combines one or more of the rugged Sioux M Series Water Heater and circulation pump with an atmospherically-vented water tank. The system also contains an additional pump to discharge water from the storage tank. Tank includes liquid level sensor with inlet water solenoid valve, liquid level sight gauge, adjustable digital temperature control, thermometer, ladder, inspection hatch, and motorized exhaust stack damper. The entire system is mounted on a rugged steel skid for portability. Each heater module provides 1,000,000 BTU/hr. Standard power source is 230V/3Ph/60Hz or 460V/3Ph/60hz.



## Model HWP-2

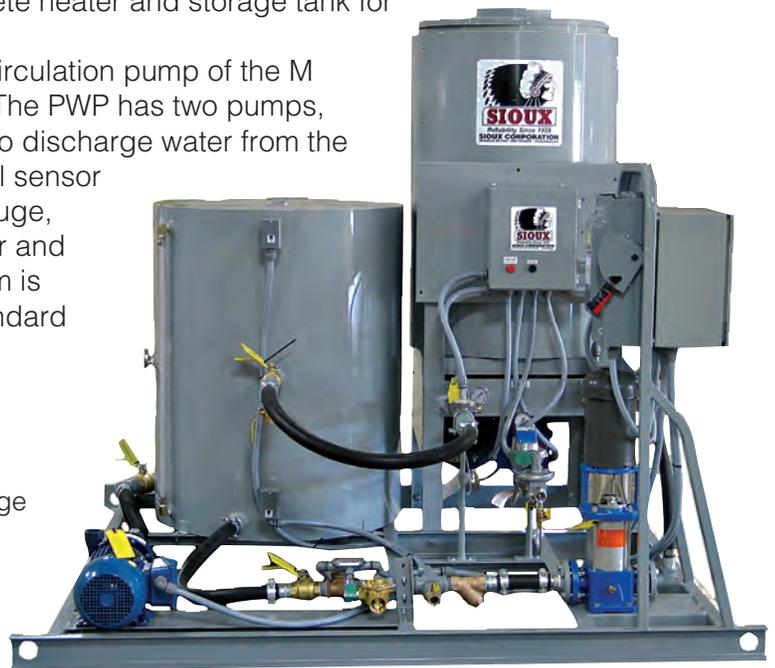
- M-2 water heater with 1,000 gallon (3784.4 liter) tank shown
- Seven-Stage Circulation Pumps and Single-Stage Discharge Pump shown.
- Shown with optional fuel storage tank.

- Available in Oil, LP or Natural Gas or Combination.
- Standard with Seven-Stage Circulation Pump(s) and one Single-Stage Discharge Pump.
- Standard tank size is 1,000 gallon (3784.3 liters). Other tank sizes are available.

# PWP Series (Precast Water Plant)

The PWP Series is designed to provide a complete heater and storage tank for precast concrete plants.

The PWP Series includes the water heater and circulation pump of the M Series with an atmospherically-vented water tank. The PWP has two pumps, one to circulate water through the heater and one to discharge water from the storage tank to the mixer. Tank includes liquid level sensor with inlet water solenoid valve, liquid level sight gauge, adjustable digital temperature control, thermometer and motorized exhaust stack damper. The entire system is mounted on a rugged steel skid for portability. Standard power source is 230V/3Ph/60Hz or 460V/3Ph/60hz.



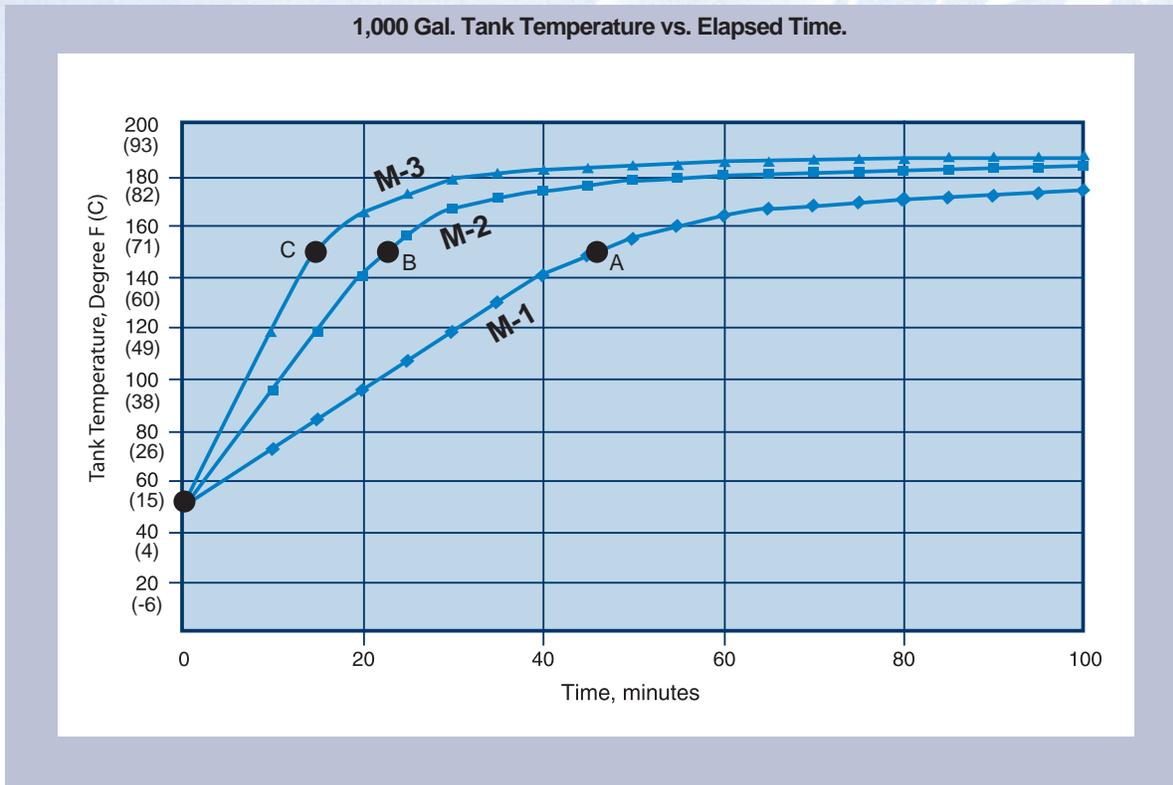
## Model PWP-1000

- LP Gas Fired
- Seven-Stage Circulation Pump and Single-Stage Discharge Pump shown
- 225 gallon (851.5 liter) water storage tank shown.

- Available in Oil, LP or Natural Gas or Combination.
- Seven-Stage Circulation Pump(s) and one Single-Stage Discharge Pump are standard.
- A 225 gallon (851.5 liter) steel water storage tank is standard. Other tank sizes are available.

# Water Heater Performance

## Performance for M Series



### Performance Chart Notes:

1. All ratings are based upon operation at 70°F (21.1°C) and at sea level conditions.
2. Derate 4% per each 1,000 feet (304.8m) altitude over 3,000 feet (914.4m).

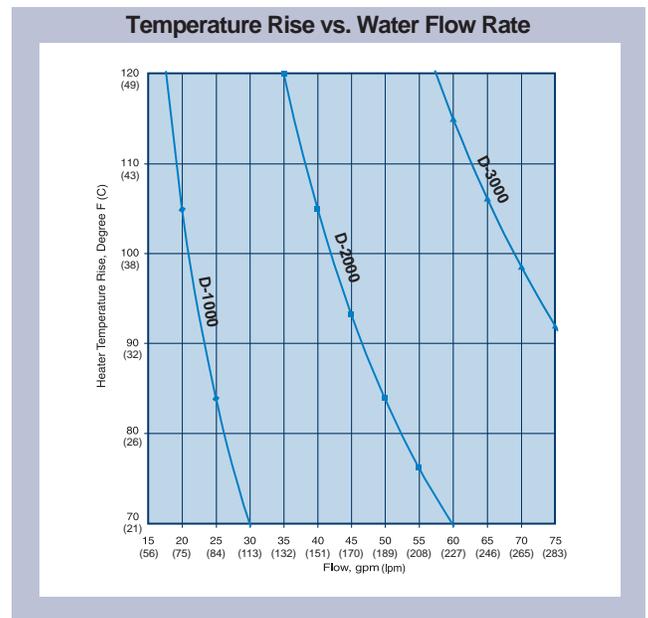
**NOTE:** As an example of the application of the first chart, consider the time to heat a 1,000 gallon (3784.3 liter) storage tank of water from 50°F (10°C) to 150°F (65°C) (a 100°F (37.7°C) temperature rise in the storage tank). The M-1 (one burner unit) takes 45 minutes (Point A). The M-2 (two burners) takes 22.5 minutes (Point B), or half the time of the M-1. The M-3 (three burners) takes 15 minutes (Point C), or 1/3 the time of the M-1 unit.

Use these two performance charts to select the heater size for your application. Locate the gallons (liters) per minute of hot water needed, then locate required water temperature rise (temperature rise is the difference between the heater discharge water temperature and the heater inlet water temperature). Select a model that meets or exceeds the BTU/hour figure from the specification chart on page 6.

Minimum recommended flow is 15 GPM (56.78 LPM) per circulation pump.

## Performance for D Series

### Temperature Rise vs. Water Flow Rate



# Specification Chart

Model	Net Heat Output BTU/hr	KW Out	Required Input BTU/hr	KW In	Boiler Horse-power	Number of Burner Systems		Water Conn.	Number of Pumps	Number of Water Tanks	Standard Electricals	Approx. Unit Dimensions L x W x H		Approx. Shipping Weights
						Oil	Gas					Inches	CM	
<b>D Series</b>													lbs. (kgs)	
D-1000	1,000,000	293	1,180,000	346	30	1	1 (A)	1 (B)	—	—	115/1/60	60 x 37 x 82	152 x 94 x 208	1,030 (467.2)
D-2000	2,000,000	586	2,360,000	692	60	2	2 (A)	2 (B)	—	—	115/1/60	60 x 72 x 82	152 x 123 x 208	1,800 (816.47)
D-3000	3,000,000	879	3,540,000	1038	89	3	3 (A)	3 (B)	—	—	115/1/60	60 x 104 x 82	152 x 264 x 208	2,780 (1261)
<b>M Series</b>														
M-1	1,000,000	293	1,180,000	346	30	1	1 (A)	1 (B)	1 (C)	—	230-460/3/60	80 x 37 x 82	152 x 94 x 208	1,470 (657.7)
M-2	2,000,000	586	2,360,000	692	60	2	2 (A)	2 (B)	2 (C)	—	230-460/3/60	80 x 72 x 82	152 x 83 x 208	2,890 (1292.7)
M-3	3,000,000	879	3,540,000	1038	89	3	3 (A)	3 (B)	3 (C)	—	230-460/3/60	80 x 104 x 82	152 x 204 x 208	4,085 (1825.7)
<b>HWP Series</b>														
HWP-1	1,000,000	293	1,180,000	346	30	1	1 (A)	1 (B)	2 (C)	1 (D)	230-460/3/60	124 x 80 x 85	315 x 203 x 203	3,420 (1542)
HWP-2	2,000,000	586	2,360,000	692	60	2	2 (A)	2 (B)	3 (C)	1 (D)	230-460/3/60	124 x 80 x 80	315 x 203 x 203	4,540 (2041)
HWP-3	3,000,000	879	3,540,000	1038	89	3	3 (A)	3 (B)	4 (C)	1 (D)	230-460/3/60	124 x 80 x 80	315 x 203 x 203	6,060 (2721.6)
<b>PWP Series</b>														
PWP-1000	1,000,000	293	1,180,000	346	30	1	1 (A)	1 (B)	2 (C)	1 (E)	230-460/3/60	93 x 80 x 82	230 x 203 x 208	1,720 (771)

Note: Heat output is approximate - refer to pg 4 for detailed information.

- Gas inlet connection is 1" (38.1mm) diameter pipe on D, M and HWP Series, plus Model PWP-1000; Inlet connection height is 16-1/2" (419.1mm) from ground on all units.
- Inlet water connection is 1-1/2" (38.1mm) diameter pipe on D, M, HWP and PWP Series; 2" (50.8mm) on M Series; 1-1/2" (38.1mm) on PWP Series. Outlet water connection is 2" (50.8mm) diameter pipe on all models. Inlet connection height is 20" (508mm) from ground on D Series; 8-1/2" (215.9mm) on M Series; 7" (177.8mm) on M-G Series; call factory for HWP and PWP.
- Pumps on M Series are circulating pumps. Pumps on HWP and PWP Series include one discharge pump, and the balance are circulating pumps. See "Pump Selection" on page 9.
- HWP units include one 1,000-gallon (3,784.3-liter) water tank. Features 1/4" (6.35mm) hot-rolled steel plate construction, 68"D x 72"H (1.73mD x 1.83mH). Tank base is 72" (1.83m) square, 1/4" (6.35mm) steel plate. Includes ladder, inspection port, 1-1/2" (38.1mm) drain valve, and float valve assembly.
- PWP units include one 225-gallon (851.5-liter) water tank. Features 14-gauge mild steel construction, 28"D x 48"H (711.2mmD x 1,219mmH). Includes 3/4" (19mm) drain plug, liquid level sensors and water solenoid valve.

All data is subject to change; call factory prior to construction for exact data for your model.

## GENERAL FUEL SYSTEM GUIDELINES:

- Oil-fired units:
  - Approximate fuel consumption: 9.0 GPH (34 LPH) (at 290 PSI (20 BAR) with No. 2 fuel oil) per burner system.
  - No. 1 fuel, No. 2 fuel, or kerosene usage permissible on all machines.
- Gas-fired units:
  - Approximate fuel consumption (when fired in accordance with Sioux gas pressure requirements):
    - Natural gas-fired units: 1,180 CFH per burner (reducing fuel consumption will increase efficiency).
    - LP gas-fired units: 13.13 GPH or 55.6 lbs./hour (49.69 LPH or 25 kgs./hour) per burner.
  - Gas pressure requirements:
    - Natural gas-fired units: 7-9" (177.8- 228.6mm) water column pressure at burner (0.25 to 0.33 PSI (.017- .023 BAR)).
    - LP gas-fired units: 13.13 GPH or 55.6 lbs./hour (49.69 LPH or 25 kgs./hour) per burner.
      - 14" (355.6mm) maximum and 10" (254mm) minimum water column pressure at burner (0.40-0.47 PSI (0.27- 0.32 BAR)).
      - One 1,000-gallon (3,784.3-liters) LP fuel tank is required for each 1,000,000 BTU/hour burner.
      - Consult your local gas supplier for capabilities and requirements of your local service.

## Pump

**Goolds Circulation Pump** (standard)—The Gould vertical seven-stage circulation pump with 3 HP motor is the standard circulation pump on M, HWP and PWP 3 phase units. It features 304L stainless steel housing, impellers and shaft. The pump has a maximum head pressure of 104 PSI (heads to 245 ft). Stainless steel liquid end components offer high quality and corrosion resistance. Back pullout construction allows easy overhaul of impeller and seal without disturbing suction and discharge connections. TEFC (totally enclosed fan cooled) 3 HP motors are standard on all M, HWP, PWP 3 phase units. Operating speed is 3450 RPM.

The Sioux Portable Water Plant (PWP 1000) comes standard with one circulation pump as described above, and one single stage discharge pump with 3 HP motor.

**Price Discharge Pump**—The standard discharge pump is a Price brand, single-stage, horizontal pump, with a 5 HP motor. Optional 7.5 and 10 HP available upon request.

# Options and Accessories

**Draft Diverter/Damper Assembly**—Exhaust assembly equalizes stack pressure and helps prevent cold air from entering stack (which may freeze heating coil). 12" (304.8mm) stack opening, 38" (965.2mm) high. One assembly required for each one-million BTU/hour heater module. For use on D, M and HWP Series.

- SA00153** Motorized Damper
- SA00154** Motorized Draft Diverter/Damper—115 volt, electrically-operated.

**Water Solenoid/Liquid Level Sensor**—Valve and switch work in tandem to keep water at specified level in customer water tank. For use on D and M Series.

- FT00815** 1" (25.4mm) Water Solenoid Valve
- FT00816** 2" (50.4mm) Water Solenoid Valve
- FT00783** 1-1/2" (25.4-38.1mm) Water Solenoid Valve
- EC00303** Liquid Level Sensor Switch

**Pumps**—**Circulating Pumps** circulate water between water holding tank and heater. **Loading Pumps** move water from water heater tank to truck or other destination. See "Pump Selection" Section above for detailed information on single-stage and two-stage pumps.

- SA00105** Circulating Pumping Station, Seven-Stage, Centrifugal, 3 HP, 230/3/60 or 460/3/60.
- SA00108** Discharge Pump, Single-Stage, Centrifugal, 5 HP, 230/3/60 or 460/3/60, Price Brand.

**Rain Cap**—Prevents precipitation from interfering with burner operation in outdoor applications. One rain cap is needed for each one-million BTU/hour heater module. Heavy-duty stainless steel construction on all models.

- AC00696** 12" (304.8mm) Rain Cap

**Alternate Electricals**—Electrical system other than listed standard. Contact factory.

**Sioux Water Treatment System**—Sioux's Water Treatment System treats the water by sequestering (binding up) the dissolved scale-causing minerals. A sequestering agent (polyphosphate) is added to the water which binds with the scale-causing minerals and keeps them in solution form, thus preventing hard water scale. This significantly reduces scheduled deliming, and makes descaling of your coil easier and faster, increasing the life of your investment.

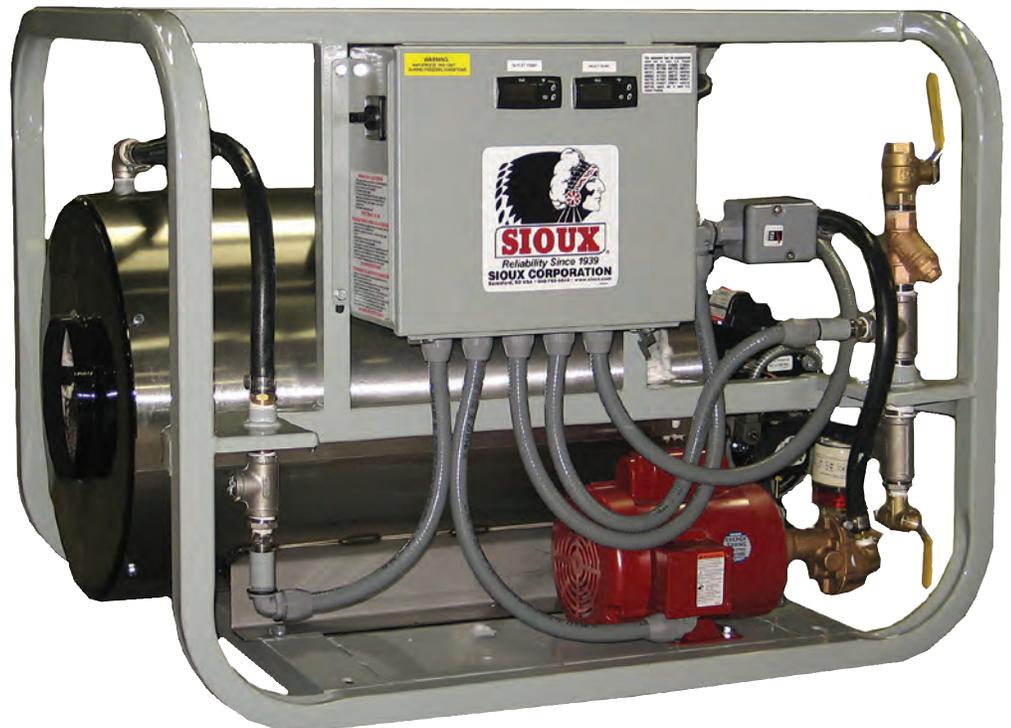
- AC00423** Sioux Water Treatment Scale Inhibitor Kit: 500,000 gallon usage
- AC00421** Pre-filter with 140 mesh screen, recommended for use with **AC00432** if you have sandy or dirty water
- AC00418** Replacement cartridge for **AC00423**
- AC00426** O-Ring for replacement cartridge **AC00418** recommended for purchase with **AC00418**

**Sioux Biodegradable Liquid Descaler**—Excellent at removing scale on systems with existing scale build-up. This biodegradable liquid is formulated to economically and effectively dissolve scale build up in your machines. Sioux Descaler can and should be used to remove scale build-up when needed on all hot water equipment including water heaters.

- AC00555** 5 gallon jug of liquid Sioux Descaler
- AC00556** 30 gallon drum of liquid Sioux Descaler
- AC00794** 55 gallon drum of liquid Sioux Descaler

## M-415: Water Heater for Mobile Mixers

The M-415 is designed to easily mount on a volumetric mixer truck for hot water on the go. The 415,000 BTU heater features standard 12 volt DC or option 120 volt AC burner controls, Honeywell protectorelay with flame monitoring burner control, rotary gear type pump with stainless steel shaft, inline temperature gauge with adjustable tank temperature control, and a fully enclosed TEFC ½ HP motor. The heater also has electrical controls with on/off switch for water circulation pump and burner and can easily be connected to the trucks fuel system. The heater is capable of achieving 100°F temperature rise on 500 gallons (1892.1 liters) of water over one hour.



# Sioux Hybrid Water Heater

## Maximizing the Benefits of Coil and Direct-Fired Heating Technologies

### Benefits of the Sioux Hybrid Heater

- Produces 205°F discharge water.
- Achieves 99% true efficiency.
- Provides recirculation mode, as required to maintain water storage tank temperature.
- Media section provides exceptionally high overall efficiency.
- Coil section allows the heater to reach high temperature without producing steam.
- Ships complete. No assembly required. Simply connect:
  - Electricity (460, 230 or 208 Volts, 3 Phase, 60 Hz) alternate electricals available
  - Water
  - Fuel (LP, NG, Diesel or Combination)

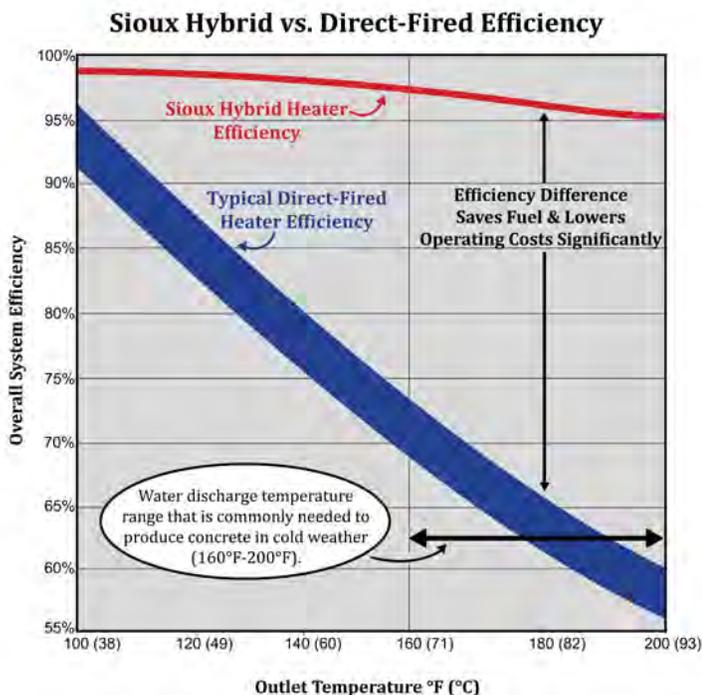
### Myths of Direct-Fired Water Heaters

- 99.9 % Efficiency.
- Efficiently recirculate a storage tank.
- Efficiency can be measured by exhaust gas temperature.
- Storage tanks are unnecessary.

### The Truth about Direct-Fired Water Heaters and Why the Sioux Hybrid Water Heater is Superior

- **Stack temperature does NOT provide an accurate measure of combustion efficiency. EFFICIENCY = Energy out / Energy in:** This data is difficult to measure: energy content of fuel used, fuel consumption, water temperature and flow, combustion air temperature and flow, electrical consumption, and other variables which are difficult to measure. Imagine this: If only 50% of the fuel was burned (for example from water drops contacting fuel prior to combustion), stack temperature would be low, but efficiency would be terrible... Therefore low stack temperature does not mean high efficiency.
  - **The SIOUX Hybrid Heater** has been designed as a high-efficiency system that achieves 99% true efficiency.
- **At what discharge temperature is efficiency measured?** Heater efficiency should be measured at the typical operating temperature for your plant, which for most ready mix customers, is 160°F (71°C) to 180°F (82°C). Direct-fired units measure efficiency well below that temperature. Typical direct-fired heater efficiency is much lower at the temperature required, due to heating water into steam, which escapes out the exhaust.
  - **The SIOUX Hybrid Heater's** coil section of the design eliminates this problem because high temperatures are reached within the coil section where the water cannot escape as steam, so you can heat water to much higher temperatures, and maintain exceptional efficiency.

- **What is efficiency during recirculation?** With a typical direct-fired unit operating in recirculation mode (where tank water is pumped through the heater to maintain tank temperature), the heater exhaust temperature soars well above the design limit, thereby discharging excessive steam to the atmosphere, resulting in totally unacceptable efficiency.
  - **The SIOUX Hybrid Heater** has been designed specifically to recirculate to a water storage tank and maintain high efficiency. The ability to heat water to 205°F (96°C), and the use of a modulating burner make the Hybrid design ideal for maintaining tank water temperature.





## Specification Charts

### Sioux Hybrid Water Heater - 3M BTU

3M BTU	Input BTU/hr	Efficiency %	Output BTU/hr	Operating Current	Boiler HP	Maximum Flow Gal/min (L)	Inlet Pump	Minimum Flow Gal/min (L)	Discharge Pump
460/3/60	3,061,224	99%	3,000,000	16 Amps	90	100 (378)	3HP	40 (151)	5HP
230/3/60	3,061,224	99%	3,000,000	30 Amps	90	100 (378)	3HP	40 (151)	5HP

**ELECTRICALS**  
230 or 460V/3PH/60Hz (alternate electricals available)

**GAS CONNECTION & WATER CONNECTIONS**  
A. Gas inlet connection is 2" (.05m) NPT; Inlet connection height is 54" (1.37m) above ground.  
B. Inlet water connection is 2" (.05m) NPT. Outlet water connection is 2" (.05m) NPT. Inlet connection height is 10" (.25m) above ground.

**FUEL SYSTEM REQUIREMENTS**  
Natural Gas-fired units:  
A. Approximate fuel consumption: 3,060 CFH  
B. Gas pressure requirements: 10" to 14" (.25m to .35m) water column pressure at burner (0.43 PSI (0.0296BAR)); 10" (.25m) minimum gas pressure must be maintained during heater operation.

LP Gas-fired units:  
A. Approximate fuel consumption: 33.34 GPH (126.19 LPH) or 142 lbs/hour (64.4 kg/hour).  
B. Gas pressure requirements: 10" to 14" (.25m to .35m) water column pressure at burner (0.43 PSI (0.0296BAR)); 10" (.25m) minimum gas pressure must be maintained during heater operation.

Diesel-fired units:  
A. Approximate fuel consumption: 21.5 GPH (81.38 LPH).

**SHIPPING INFORMATION**  
A. Approximate shipping weight 4,500 lbs (2041.2 kg).  
B. Shipping dimensions- 46" W x 150" L x 78" H (1.17m W x 3.81m L x 1.98m H)

### Sioux Hybrid Water Heater - 6M BTU

6M BTU	Input BTU/hr	Efficiency %	Output BTU/hr	Operating Current	Boiler HP	Maximum Flow Gal/min (L)	Inlet Pump	Minimum Flow Gal/min (L)	Discharge Pump
460/3/60	6,122,449	99%	6,000,000	30 Amps	179	250 (946)	10HP	100 (378)	10HP
230/3/60	6,122,449	99%	6,000,000	60 Amps	179	250 (946)	10HP	100 (378)	10HP

**ELECTRICALS**  
230 or 460V/3PH/60Hz (alternate electricals available)

**GAS CONNECTION & WATER CONNECTIONS**  
A. Gas inlet connection is 3" (.07m) NPT; Inlet connection height is 71.5" (1.8m) above ground.  
B. Inlet water connection is 4" (.1m) NPT. Outlet water connection is 3" (.07m) NPT. Inlet connection height is 17.5" (.44m) above ground.

**FUEL SYSTEM REQUIREMENTS**  
Natural Gas-fired units:  
A. Approximate fuel consumption: 6,100 CFH  
B. Gas pressure requirements: 10" to 14" (.25m to .35m) water column pressure at burner (0.43 PSI (0.0296BAR)); 10" (.25m) minimum gas pressure must be maintained during heater operation.

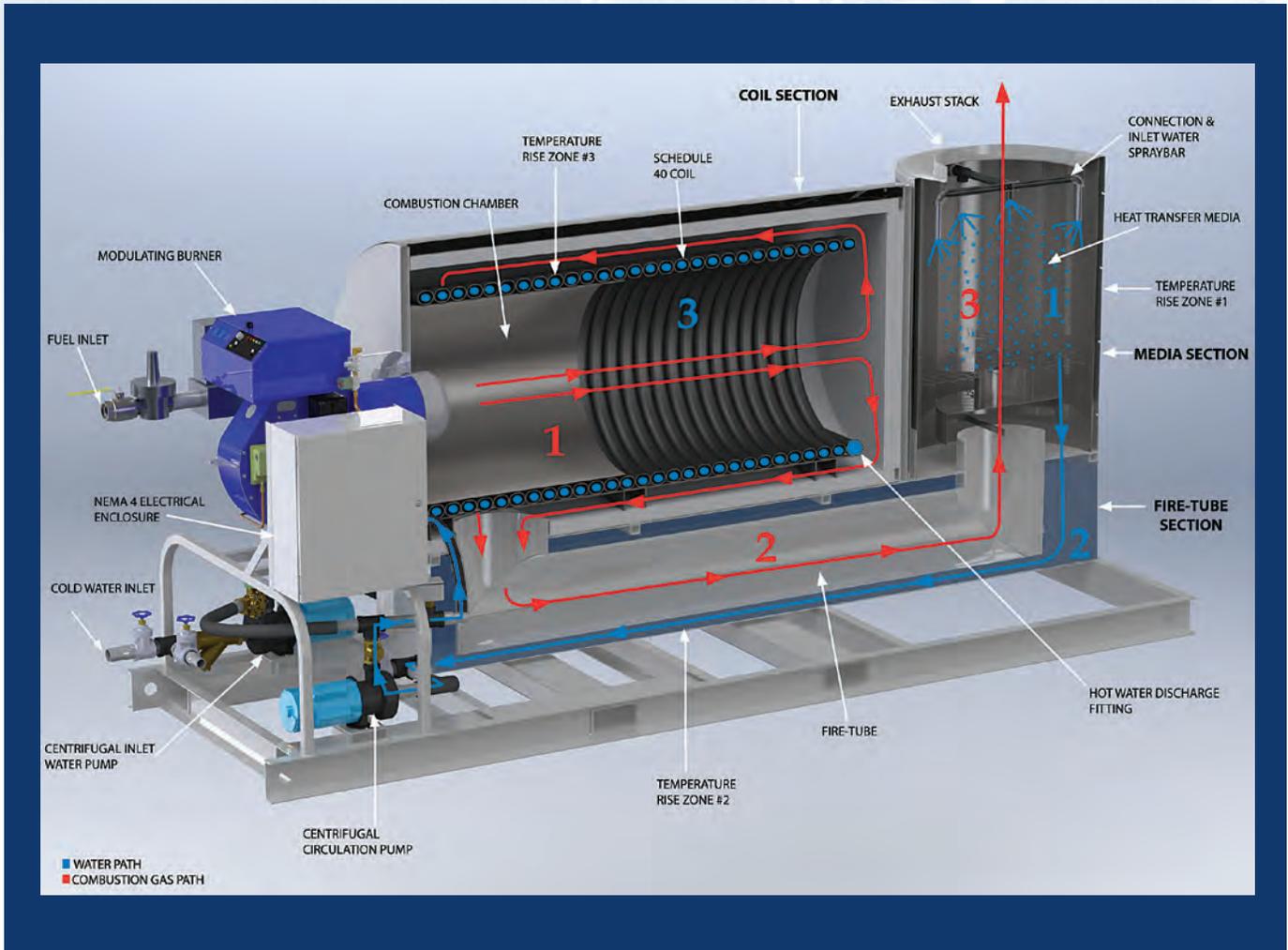
LP Gas-fired units:  
A. Approximate fuel consumption: 68 GPH (257 LPH) or 290 lbs/hour (132 kg/hour).  
B. Gas pressure requirements: 10" to 14" (.25m to .35m) water column pressure at burner (0.43 PSI (0.0296BAR)); 10" (.25m) minimum gas pressure must be maintained during heater operation.

Diesel-fired units:  
A. Approximate fuel consumption: 44 GPH (167 LPH).

**SHIPPING INFORMATION**  
A. Approximate shipping weight 10,000 lbs (4,536 kg).  
B. Shipping dimensions- 90" W x 230" L x 87.5" H (2.3m W x 5.81m L x 2.2m H)

Efficiency figures are for normal operation. In water tank recirculation mode, efficiency may be slightly lower.

# Principles of the Sioux Hybrid Water



Operation of the Hybrid Heater is fairly simple: Please see the illustration above, and consider the flow of **combustion gas** (in red), and then the flow of **water** (in blue).

**COMBUSTION GAS FLOW:** In the illustration above, combustion gas as shown in red, flows from the burner on the left side, through the fire-tube, to the media section on the right.

1. The **modulating power burner** and combustion chamber are engineered to provide maximum combustion of the fuel supplied to the heater. This heated gas passes through the center of the heating coil, and then along the exterior of the heating coil (red Section 1). This two-pass, high-efficiency design maximizes heat transfer into the water flowing in the coil. Three standard burners are available: (1) gas fired (which can

be changed between natural gas and LP gas in one minute by removing or inserting an orifice), (2) diesel fired, or (3) a combination gas/diesel burner which can burn NG, LP, or diesel. The burner is conveniently located for easy access and maintenance.

2. Next, combustion gas passes through the process tank pipe (red Section 2).
3. Lastly, combustion gas passes through the media section (red Section 3) and exits the heater at the exhaust stack.

# Heater

**WATER FLOW:** In the illustration, water as shown in blue, flows (in the opposite direction as combustion gas) from the media section on the right, through the fire-tube section, to the coil section on the left.

1. Water is fed into the media section (blue Section 1) by a **centrifugal inlet water pump** through the inlet water spray bar. The spray bar distributes water evenly across the media heating section where water flows by gravity around the stainless steel media material contained in an insulated, stainless steel tank. In the media section, water comes in contact with combustion gas and stainless steel media rings, capturing remaining combustion gas heat, providing the first water temperature rise.
2. Water then drops into the **stainless steel process** tank (blue Section 2), through which passes the combustion gas pipe, thereby providing the second water

temperature rise. The inlet water pump is controlled to maintain the water level in this tank, providing a constant supply of preheated water for the third and last heating section.

3. A **centrifugal discharge pump** feeds water from the process tank through the coil in the third heating section (blue Section 3), and out the heater discharge to the customer's storage tank. The heating coil consists of a **two-pass, high-efficiency, schedule 40 heating coil** built to ASME Code and is individually inspected by Hartford Boiler. The burner is controlled to heat water to the final discharge temperature setting, which is maintained regardless of incoming water temperature. Discharge water temperature can be set to a maximum of 205°F (96°C), adjustable in one degree increments.

## Standard Construction

**Skid:** Heavy-duty welded structural channel steel with incorporated forklift pockets, lifting points, and gussets with holes for bolting to a concrete pad.

**Heat Exchange System:** Includes three parts. The first part is a heavy-duty schedule 40 carbon steel pipe, horizontally-mounted, electrically-welded heating coil. Part two consists of a stainless steel exhaust pipe heat exchange system that transfers heat to the water in the process tank. Part three includes stainless steel heat exchange media and spray bar that utilizes the remaining exhaust heat. Each Sioux Water Heater coil is built to stringent ASME (American Society of Mechanical Engineers) standards, individually tested and inspected, and is permanently registered with the National Board of Boiler and Pressure Vessel Inspectors.

**Electrical System:** Features a PLC control with touch screen information center for easy operation monitoring, variable

frequency drive (VFD) control which automatically adjusts inlet water flow rate to maximize performance, TEFC motors with magnetic starters, and low-flow indicator. Electrical components are mounted in NEMA-4 water tight, dust proof industrial electrical enclosures. Single point electrical connection with service rated disconnect breaker.

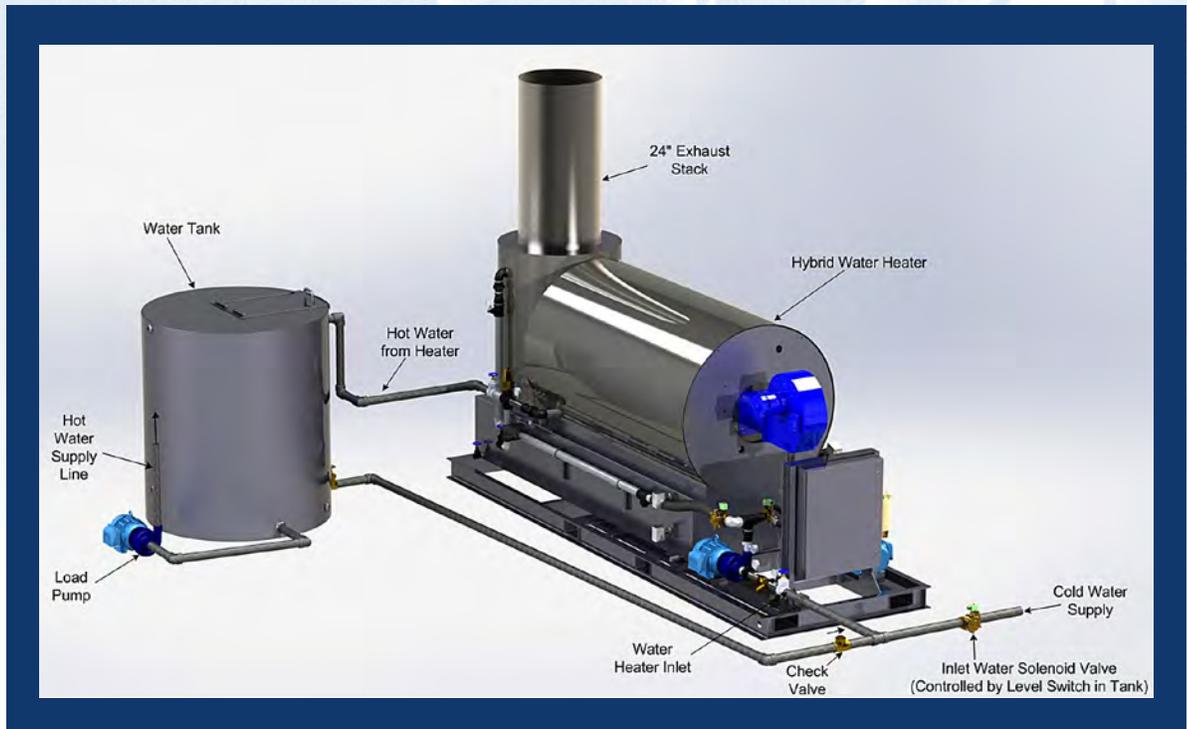
**Burner:** Available in oil, liquid propane, natural gas or a combination burner which can operate using all three. All burners include a flame monitoring safety ignition system to prevent burner operation if a flame is not present. Burner system provides an integral package with a forced air, adjustable pressure fuel system, and a UL-listed moisture-proof constant-duty transformer with spark ignition. Gas burner system is a UL-listed high efficiency power gas burner with an ASME-CSD-1 approved gas train. Combination burner system includes a remote, electrically powered fuel pump for operation with diesel fuel. Consult factory for more details.

## Additional Features

- Digital temperature control and the modulating burner system maintain discharge water temperature within 5°F (2.8°C) of setpoint.
- Dual high temperature limit switches provide redundant high temperature limit controls, added safety and meet ASME requirements.
- Flow switch shuts down burner operation if flow is too low, increasing safety and protecting components from damage.
- ASME rated pressure relief valve for safety.
- Inlet and outlet pressure gauges and thermometers to monitor performance and use in troubleshooting.
- Inlet water Y-Strainer prevents debris from entering the heater.
- Water shut-off valves for easy delimiting, draining and maintenance.

# Typical Installation

Shown is a typical installation of a Hybrid Water Heater. This is only an example to assist you in determining how a Sioux unit might fit into your operation.



## What Makes Sioux Different?

Since 1939, Sioux has been helping customers in a wide range of industries solve challenging problems by engineering and manufacturing innovative, application-specific equipment. Proven durability and reliability make Sioux the best value for demanding applications.

### Reliability Guarantee

Sioux offers the only twenty-year reliability guarantee in the industry which includes same day shipment of stock parts orders, and lifetime parts department support. See details in form 308 and form 847.

### Conservative Design

Sioux does not undersize components such as motors, pumps, burners, frames, or engines, which is common elsewhere.

### Proven Performance

Sioux machines are dependable in the field. Combining high quality components with over 70 years of custom manufacturing experience and extensive engineering design capabilities allows Sioux to provide the industrial workplace with the best cleaning equipment for continuous operation.

### Simple Operation

Sioux machines are designed to be simple to install, operate, and maintain.

### Safety

In addition to dependability and simple operation, operator safety is a top design consideration for all Sioux products.

### Factory Testing

Every Sioux machine is thoroughly tested in our on-site testing facility before it leaves the factory.

### Custom Capabilities

Sioux is well-known for its capability to design and build custom equipment, and has one of the highest ratios of engineering staff to total staff in the industry. Specialized options can be added to the unit to meet your specific needs. Some of these include trailer or portable mountings, nearly any voltage for overseas applications, water tanks, alterations for severe temperature or altitudes, custom sizes and more.

### A Well-Deserved Reputation — The Best

Sioux machines are constructed to provide long life and trouble-free service in the industrial workplace, and include standard features that are often considered options on competitive models. These features may initially cost a little more, but provide equipment that runs better, lasts longer, is safer to operate and, over the life of the unit, provides a superior return on your investment.



**Call us toll-free at (888) 763-8833**  
or visit us at [www.sioux.com](http://www.sioux.com)

### SIoux CORPORATION

One Sioux Plaza • Beresford, South Dakota 57004-1500 USA  
Toll-free: (888) 763-8833 • Tel: (605) 763-3333 • Fax: (605) 763-3334  
E-mail: [email@sioux.com](mailto:email@sioux.com) • [www.sioux.com](http://www.sioux.com)



Form #670-13