SEISCO®
PRODUCT DESCRIPTION & SPECIFICATIONS

General Product Description

SIZE: Seisco Water Heaters are manufactured in two basic sizes, a large four-chamber unit (15 _" x 15 _" x 6 _") and a smaller two-chamber unit (15 _" x 10 _" x 6 _"). The same advanced microprocessor technology and thermoplastic construction are used in both sizes. Therefore, many of the parts are interchangeable.

MODELS: There are three models of each size available. The four-chamber models are RA-18, RA-22, & RA-28. These models are designed generally for domestic water heating in whole house and booster applications. Also, the two-chamber models are RA-9, RA-11, & RA-14. The two-chamber models are designed for space heating applications and point-of-use in commercial applications. The available models and their descriptions are listed on pages following this section. Refer to ***Applications & Diagrams*** for more design and application details.

FEATURES: There are no moving parts or flow restricting devices used in Seisco heaters. Seisco uses a unique flow/no flow detection system utilizing it's temperature sensors for flow detection. In standby, the heater maintains a very subtle temperature gradient and flow is detected when there is a change in the gradient. The advanced microprocessor control turns the power on through a set of relays and turns the power off when flow stops. The most important feature may be the patented "Power Sharing" technology which provides for evenly distributed power to the heating elements. This in turn, helps eliminate scalding potential, scaling and sediment build-up. Also, the control logic allows the power level to vary which is beneficial in minimizing the use of power for periods of less demanding usage.

CONSTRUCTION: Seisco heating chambers are modular and molded of light weight thermoplastic materials. The chamber is specifically engineered for durability in harsh water heating environments and capable of withstanding extreme temperature swings and pressure changes. Heating elements, sensors and detection devices, that come in contact with the water, are machined in brass or made of copper to help resist corrosion. Standard 1 _ inch, flanged screw-type heating elements are utilized which are interchangeable with heating elements available at local hardware stores.

SAFETY AND MAINTENANCE: Seisco was designed with a complete array of dependable safety features to prevent harm to the user and the heater. There are several redundant safety features as well. They include, dual high temperature switches on independent circuitry in addition to the control's internal high temperature shut down. Dual low level detectors are used to prevent dry firing of the heating elements and a leak detector is mounted on the casing that in the event of a leak, sounds an alarm to the user. Although the control board is protected against electrical surges, additional heater protection is achieved when the relays are opened during periods of standby, providing no path for the surge to reach the heating elements. Also, the chamber is designed with a patented venting system that continuously vents harmful gasses and air during operation. The microprocessor control is programmed to provide self diagnostics that significantly reduces trouble shooting and service time. In the event of a problem with the heater, the control emits a visual or optional built-in audible code. There is no maintenance required of the Seisco. However, there are clean-out plates below the heater chamber to allow removal of sand and grit that may build-up from a well water system.

POWER RATING: The four-chamber models contain four electric heating elements whose combined wattage is the total power rating of the heater. For instance, the standard RA-28 model contains four 7000 watt elements for a total of 28,000 watts, or 28 kilowatts (kW) of power. The two-chamber model, RA-14, contains only two 7000 watt elements for a total power rating of 14,000 watts, or 14 kilowatts (kW). However, because of Seisco's "Power Sharing" technology, the heater may not always use the maximum available power. The power output can vary with flow rate and temperature rise. Refer to the ***Product Specifications Table*** for the maximum power ratings of each model.

HEATING OUTPUT: The heating output of the Seisco is simply the total kilowatt power rating of the combined heating elements converted to BTU's using 3,413 BTU/kW. For instance, the RA-28 has a total power rating of 28 kW or a 95,564 BTU heat output rating. The four-chamber models have the higher output ratings; 61,434 BTU's for the RA-18 model, and 75,086 BTU's for the RA-22 model. The lower output two-chamber models, are; 47,782 BTU's for the RA-14, 37,543 BTU's for the RA-11, and 30,717 BTU's for the RA-9. These ratings vary with the operating voltage or service voltage to the heater. Refer to the ***Product Specifications Table*** for the BTU ratings of each model.

VOLTAGE RATING: Seisco heaters are manufactured with common 240 volt (AC) heating elements designed for optimum operation on a standard residential 240 volt (AC) electric service. Also, the Seisco will operate at 208 VAC, a typical commercial voltage, with standard 240 VAC heating elements. However, when operating the heater at 208 VAC, the power rating and the heat output rating is significantly reduced. Seisco models can be special ordered with 208 VAC heating elements to help maximize the power and heating output. Refer to the ***Product Specifications Table*** for details on the various voltage ratings.

MAXIMUM CURRENT RATING: Each Seisco Model has a maximum electrical current rating (or amp rating) equivalent to the sum of the heating element ratings. For example, a four-chamber model, RA-28, operating at 240 VAC has four heating elements, each with a maximum rating of 29 amps. The maximum current rating or total current rating of the RA-28 is therefore 116 amps or the sum of the four heating elements. However, because of Seisco's "Power Modulating Technology", the actual current measured during relatively low flow rates and/or low temperature rises can be less than the maximum rating of the heater during operation. Refer to the A (max) or maximum amp rating under "Electrical" in the ***Product Specifications Table*** for each model.

TEMPERATURE RISE: The temperature rise must be determined in order to help choose the appropriate Seisco heater. The rise can be determined by knowing the input water temperature and the desired output temperature of the heater. The Seisco's output temperature is typically set for about 120 degrees F at the factory. Therefore, if the input or cold water inlet temperature is 50 degrees F, then the temperature rise is the difference or 70 degrees F. If the desired output temperature is 125 degrees F, then the temperature rise would be 75 degrees F. With the temperature rise determined, the ***Product Specification Table*** provides the associated flow rate capacity of the various Seisco models.

FLOW RATE: The flow rate for each model is given in the "Temperature Rise" table of the ***Product Specification Table.*** Along with the temperature rise, the flow rate must also be determined in order to choose the appropriate Seisco heater. The flow rate is determined by the type of faucet and also, life style. Refer to the chart below for typical faucet flow rates in the home. However, if the desired life style in the home requires running multiple faucets at the same time, then the flow rates must be added together to determine the peak flow demand. The Seisco or the possibility of multiple Seisco's should be selected to match the peak flow rate.

Below are typical flow rates for new residential construction. There may be exceptions with new designer type fixtures and faucets. For instance, large custom body spa showers, whirl pool and Jacuzzi tubs may have faucets with flow rates ranging from 7 gpm to 14 gpm. However, a combination of multiple Seisco heaters (preferably plumbed in a parallel configuration) can be installed to match these higher flow rates. The same peak design approach would be necessary for the anticipated life style of multiple flow rates occurring at the same time. Otherwise, use the table below and match the Seisco according to the peak flow and associated temperature rise of a single tub or shower.

Typical Flow Rates in Gallons per Minute (gpm)

Fixture Type	Lavatory	Bathtub	Shower	Kitchen Sink	Pantry Sink	Laundry Sink	Dish-Washer
Flow Rates	0.8 – 1.5	2.0 – 4.0	1.5 – 3.0	1.0 – 1.5	1.5 – 2.5	2.5 – 3.0	2.0 – 3.0

SEISCO¤

FOUR CHAMBER MODELS

SEISCO RA-28

The RA-28 is the most popular residential model for the whole house and for commercial applications, such as specialty restaurants, convenience stores, hotels, pet grooming shops. A perfect back-up to Solar and Geothermal passive heat recovery systems and a powerful replacement for boilers and storage tanks used in Hydronic heating and Radiant Floor heating systems. (Minimum 200 AMP Whole House Electrical Service recommended)

SEISCO RA-22

The RA-22 is ideal for the whole house, apartment or condominium dwelling, where the incoming water temperature rarely drops below 55 degrees F. Also, great as a back-up to passive heat recovery systems, excellent for split systems serving individual entities such as lavatories, shower/bath rooms and kitchens. Radiant Floor heating systems, spas and hot tubs. (Minimum 150 AMP Whole House Electrical Service recommended)

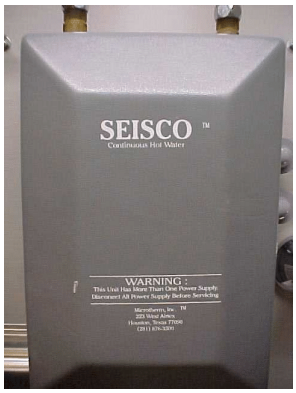
SEISCO RA-18

The RA-18 is the perfect supplement to an existing water heater which is unable to satisfy user requirements. Ideal for the whole house, where incoming water temperatures rarely fall below 65 degrees F. Excellent for split systems serving lavatories, individual showers and kitchens. Radiant Floor heating systems, spas and hot tubs. (Minimum 125 AMP Whole House Electrical Service recommended)

SEISCO¤

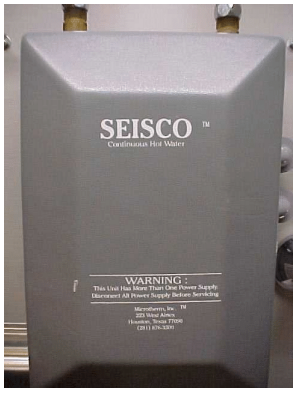
TWO CHAMBER MODELS

SEISCO RA-14



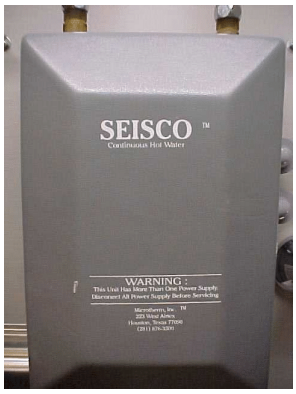
The RA-14 is excellent for point-of-use applications at single showers and multiple sinks. Ideal for supplementing existing water heaters which are unable to satisfy user requirements in beach houses, hair salons, horse stables, hunting and fishing cabins. Great for small homes, condominiums and individual entities, where the incoming water temperature rarely falls below 75 degrees F. Radiant Floor heating systems, spas and hot tubs.

SEISCO RA-11



The RA-11 is great for point-of-use applications such as coffee bars, office & industrial warehouse wash sinks, single lavatory and emergency showers; to comply with code. Perfect for RV s, small motor homes, Radiant Floor heating, and supplements existing water heaters. Requires only one 50 Amp, 240 Volt electrical circuit.

SEISCO RA-9



The RA-9 is used much like the RA-11, for point-of-use applications such as coffee bars, single sinks and emergency showers in office & industrial warehouses; to comply to code. A perfect replacement for 10 & 20 gallon tank heaters in RV s and small motor homes. Supplements existing water heaters and requires only one 40 Amp, 240 Volt electrical circuit.

Product Specification Table

Standard 240 Volt (AC) Operation, 240 VAC Rating

SEISCO¤ Electric Fluid Heating System

[FOUR CHAMBER MODELS]

MODEL	RA-28	RA-22	RA-18
kW	28	22	18
Elements	7000 watts × 4	5500 watts × 4	4500 watts × 4
Btu/hr	95560	75080	61430
kg-cal/min	400	315	258
TEMPERATURE RISE			
	95 ¡F @ 2.0 GPM 76 ¡F @ 2.5 GPM 64 ¡F @ 3.0 GPM 48 ¡F @ 4.0 GPM	75 ¡F @ 2.0 GPM 60 ¡F @ 2.5 GPM 50 ¡F @ 3.0 GPM 37 ¡F @ 4.0 GPM	61 ¡F @ 2.0 GPM 49 ¡F @ 2.5 GPM 40 ¡F @ 3.0 GPM 30 ¡F @ 4.0 GPM
	50 ¡C @ 8 L/min 40 ¡C @ 10 L/min 33 ¡C @ 12 L/min 25 ¡C @ 16 L/min	39 ¡C @ 8 L/min 31 ¡C @ 10 L/min 26 ¡C @ 12 L/min 20 ¡C @ 16 L/min	32 ¡C @ 8 L/min 26 ¡C @ 10 L/min 21 ¡C @ 12 L/min 16 ¡C @ 16 L/min
MECHANICAL			
Size H_W_D	15__15__6_ in / 40_40_16 cm	15__15__6_ in / 40_40_16 cm	15__15__6_ in / 40_40_16 cm
Plumbing fittings	_-in NPT nipple _ 2	_-in NPT nipple _ 2	_-in NPT nipple _ 2
Shipping weight	23 lbs / 10.5 kg	23 lbs / 10.5 kg	23 lbs / 10.5 kg
ELECTRICAL			
V	240	240	240
A (max)	116	91	75
Hz	50 / 60	50 / 60	50 / 60
Circuits[1]	30A _ 4	50A _ 2	40A _ 2
APPLICATIONS			
	Whole-house unit; specialty restaurants; convenience stores; hotels; pet grooming establishments. Backup to passive systems such as solar and heat-recovery. Radiant floor heating. Minimum 200A electrical service.	Whole-house unit; for use where ambient water temperature rarely drops below 55 ¡F / 13 ¡C. Radiant floor heating. Minimum 150A electrical service.	Whole-house unit; for use where ambient water temperature rarely drops below 65 ¡F / 18 ¡C. Radiant floor heating. Minimum 125 recommended electrical service.

Temperature rise refers to the *maximum* amount of water heating available, given a specific wattage and flow rate. For example, a 60 ¡F water inlet and a 120 ¡F outlet temperature represents a rise of 60 ¡F. Referring to the table above, if a flow of 3 GPM (gallons per minute) is desired, a 28-kW (kilowatt) RA-28 heater is required, which at 3 GPM can yield a temperature rise of up to 64 ¡F.

[1] Each circuit requires one double-pole breaker (240 V line to line connection).

Product Specification Table

Standard 240 Volt (AC) Operation, 240 VAC Rating

SEISCO¤ ELECTRIC FLUID HEATING SYSTEM
[TWO CHAMBER MODELS]

MODEL	RA-14	RA-11	RA-9
kW	14	11	9
Elements	7000 watts × 2	5500 watts × 2	4500 watts × 2
Btu/hr	47780	37540	30710
kg-cal/min	200	158	129
TEMPERATURE RISE			
	95 ¡F @ 1.0 GPM 64 ¡F @ 1.5 GPM 48 ¡F @ 2.0 GPM 38 ¡F @ 2.5 GPM	75 ¡F @ 1.0 GPM 50 ¡F @ 1.5 GPM 37 ¡F @ 2.0 GPM 30 ¡F @ 2.5 GPM	61 ¡F @ 1.0 GPM 40 ¡F @ 1.5 GPM 30 ¡F @ 2.0 GPM 24 ¡F @ 2.5 GPM
	50 ¡C @ 4 L/min 33 ¡C @ 6 L/min 25 ¡C @ 8 L/min 20 ¡C @ 10 L/min	39 ¡C @ 4 L/min 26 ¡C @ 6 L/min 20 ¡C @ 8 L/min 16 ¡C @ 10 L/min	32 ¡C @ 4 L/min 21 ¡C @ 6 L/min 16 ¡C @ 8 L/min 13 ¡C @ 10 L/min
MECHANICAL			
Size H_W_D	15__10__6_ in / 40_26_16 cm	15__10__6_ in / 40_26_16 cm	15__10__6_ in / 40_26_16 cm
Plumbing fittings	_-in NPT nipple _ 2	_-in NPT nipple _ 2	_-in NPT nipple _ 2
Shipping weight	15 lbs / 7 kg	15 lbs / 7 kg	15 lbs / 7 kg
ELECTRICAL			
V	240	240	240
A (max)	58	46	37.5
Hz	50 / 60	50 / 60	50 / 60
Circuits[2]	30A _ 2	50A _ 1	40A _ 1
APPLICATIONS			
	Whole-house unit; for use where ambient water temperature rarely drops below 75 ¡F / 24 ¡C. Single shower / sink; hunting and fishing cabins; supplementing existing water heaters which are unable to satisfy users requirements. Radiant floor heating.	Point-of-use such as: coffee bars; wash sinks in light industrial warehouse; emergency showers; to comply with code; supplementing existing water heaters; RV s and small motor homes; Radiant floor heating.	Point-of-use such as: coffee bars; wash sinks in light industrial warehouse; emergency showers; to comply with code; supplementing existing water heaters; RV s and small motor homes; Radiant floor heating.

Temperature rise refers to the *maximum* amount of water heating available, given a specific wattage and flow rate. For example, a 60 ¡F water inlet and a 120 ¡F outlet temperature represents a rise of 60 ¡F. Referring to the table above, if a flow of 1.5 GPM (gallons per minute) is desired, a 14-kW (kilowatt) RA-14 heater is required, which at 2 GPM can yield a temperature rise of up to 64 ¡F.

[2] Each circuit requires one double-pole breaker (240 V line to line connection).

Product Specification Table

Commercial 208 Volt (AC) Operation, 240 VAC Rating

Commercial and industrial locations are often served by 208 V three-phase electrical services. Where 240-V rated SEISCO heaters are used at 208 V, their available wattage, and therefore their temperature rise, are de-rated by 25%. The table below shows which ratings are affected. Other specifications are the same as for 240 V operation.

SEISCO¤ Electric Fluid Heating System

[FOUR CHAMBER MODELS]

MODEL	RA-28	RA-22	RA-18
kW	21	16.5	13.5
Elements	7000 watts × 4	5500 watts × 4	4500 watts × 4
Btu/hr	71670	56310	46070
kg-cal/min	300	236	194
TEMPERATURE RISE			
	71 ¡F @ 2.0 GPM 57 ¡F @ 2.5 GPM 48 ¡F @ 3.0 GPM 36 ¡F @ 4.0 GPM	56 ¡F @ 2.0 GPM 45 ¡F @ 2.5 GPM 37 ¡F @ 3.0 GPM 28 ¡F @ 4.0 GPM	45 ¡F @ 2.0 GPM 36 ¡F @ 2.5 GPM 30 ¡F @ 3.0 GPM 22 ¡F @ 4.0 GPM
	37 ¡C @ 8 L/min 30 ¡C @ 10 L/min 25 ¡C @ 12 L/min 19 ¡C @ 16 L/min	30 ¡C @ 8 L/min 24 ¡C @ 10 L/min 20 ¡C @ 12 L/min 15 ¡C @ 16 L/min	24 ¡C @ 8 L/min 19 ¡C @ 10 L/min 15 ¡C @ 12 L/min 12 ¡C @ 16 L/min
ELECTRICAL			
V	208	208	208
A (max)	101	79	65
Hz	50 / 60	50 / 60	50 / 60
Circuits	30A _ 4	50A _ 2	40A _ 2

[TWO CHAMBER MODELS]

MODEL	RA-14	RA-11	RA-9
kW	10.5	8.25	6.75
Elements	7000 watts × 2	5500 watts × 2	4500 watts × 2
Btu/hr	35830	28150	23030
kg-cal/min	150	118	96
TEMPERATURE RISE			
	71 ¡F @ 1.0 GPM 48 ¡F @ 1.5 GPM 36 ¡F @ 2.0 GPM 28 ¡F @ 2.5 GPM	56 ¡F @ 1.0 GPM 37 ¡F @ 1.5 GPM 27 ¡F @ 2.0 GPM 22 ¡F @ 2.5 GPM	45 ¡F @ 1.0 GPM 30 ¡F @ 1.5 GPM 22 ¡F @ 2.0 GPM 18 ¡F @ 2.5 GPM
	37 ¡C @ 4 L/min 25 ¡C @ 6 L/min 19 ¡C @ 8 L/min 15 ¡C @ 10 L/min	29 ¡C @ 4 L/min 19 ¡C @ 6 L/min 15 ¡C @ 8 L/min 12 ¡C @ 10 L/min	24 ¡C @ 4 L/min 15 ¡C @ 6 L/min 12 ¡C @ 8 L/min 9 ¡C @ 10 L/min
ELECTRICAL			
V	208	208	208
A (max)	50.5	39.5	32.5
Hz	50 / 60	50 / 60	50 / 60
Circuits	30A _ 2	50A _ 1	40A _ 1

Product Specification Table

Commercial 208 Volt (AC) Operation, 208 VAC Rating

Commercial and industrial locations are often served by 208 V three-phase electrical services. SEISCO heaters are available with 208 V heating elements that are 10 to 15% lower wattage than the 240 V elements. Therefore the heater s temperature rise is lower. The table below shows which ratings are affected.

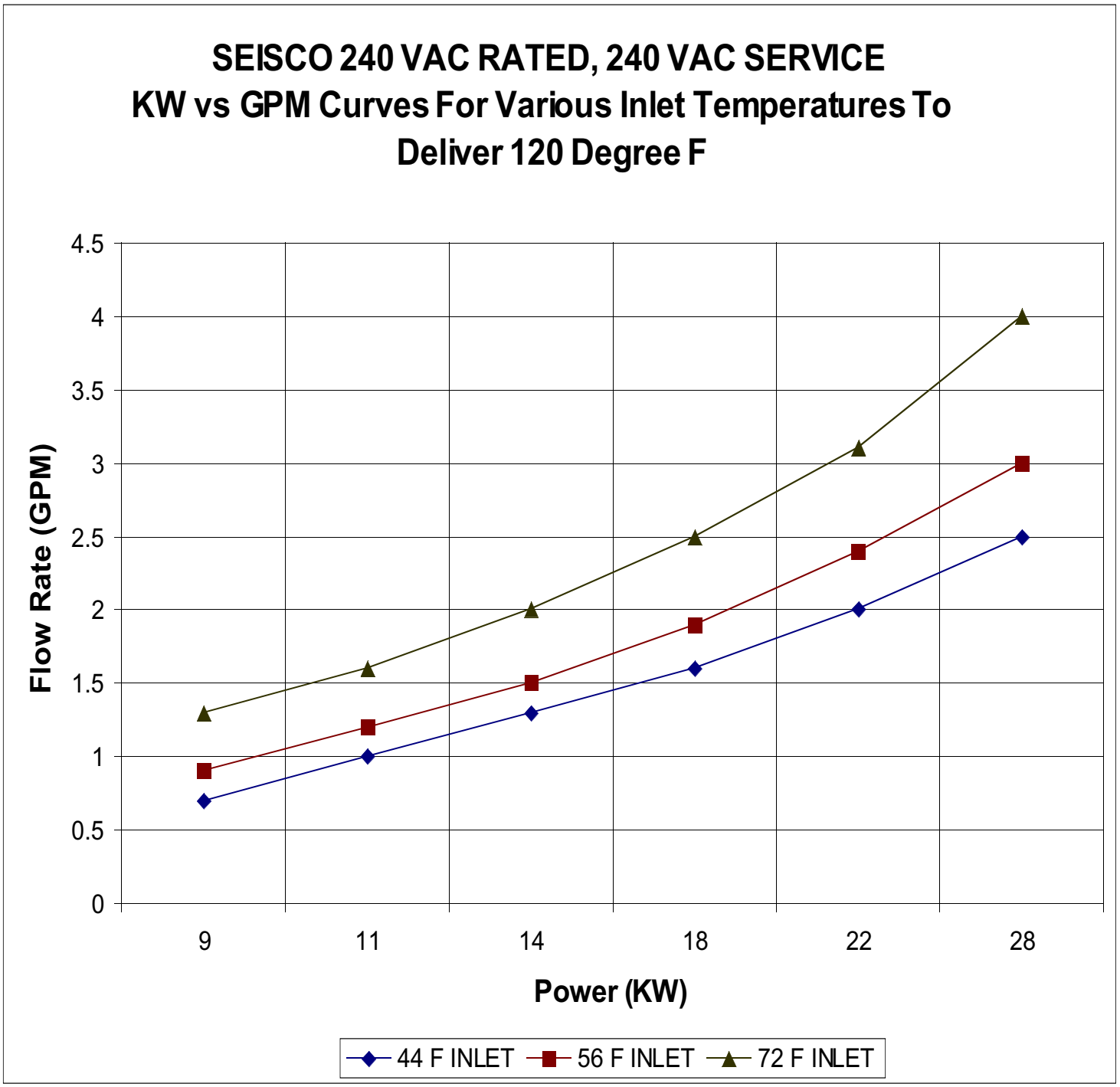
SEISCO¤ Electric Fluid Heating System

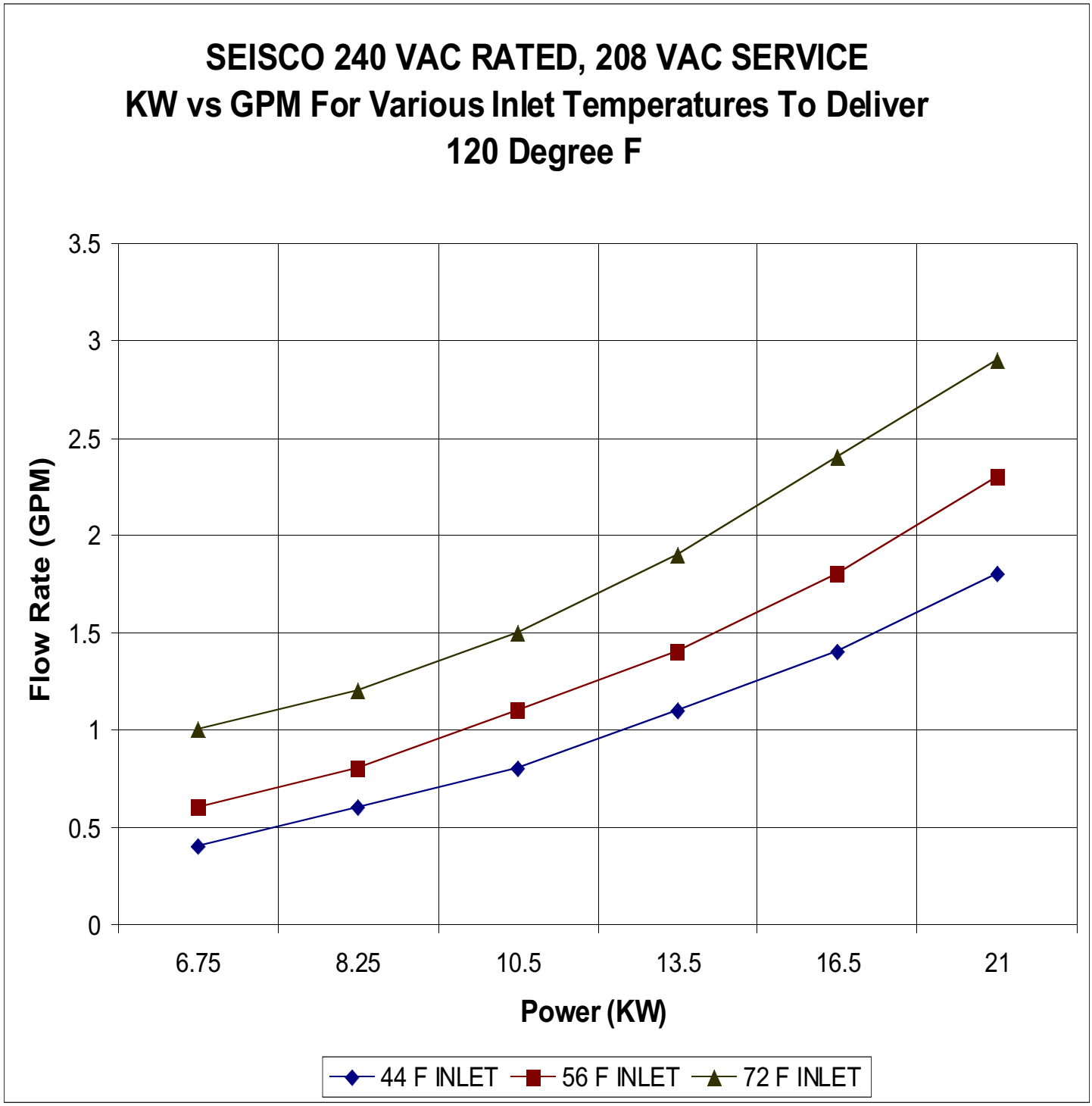
[FOUR CHAMBER MODELS]

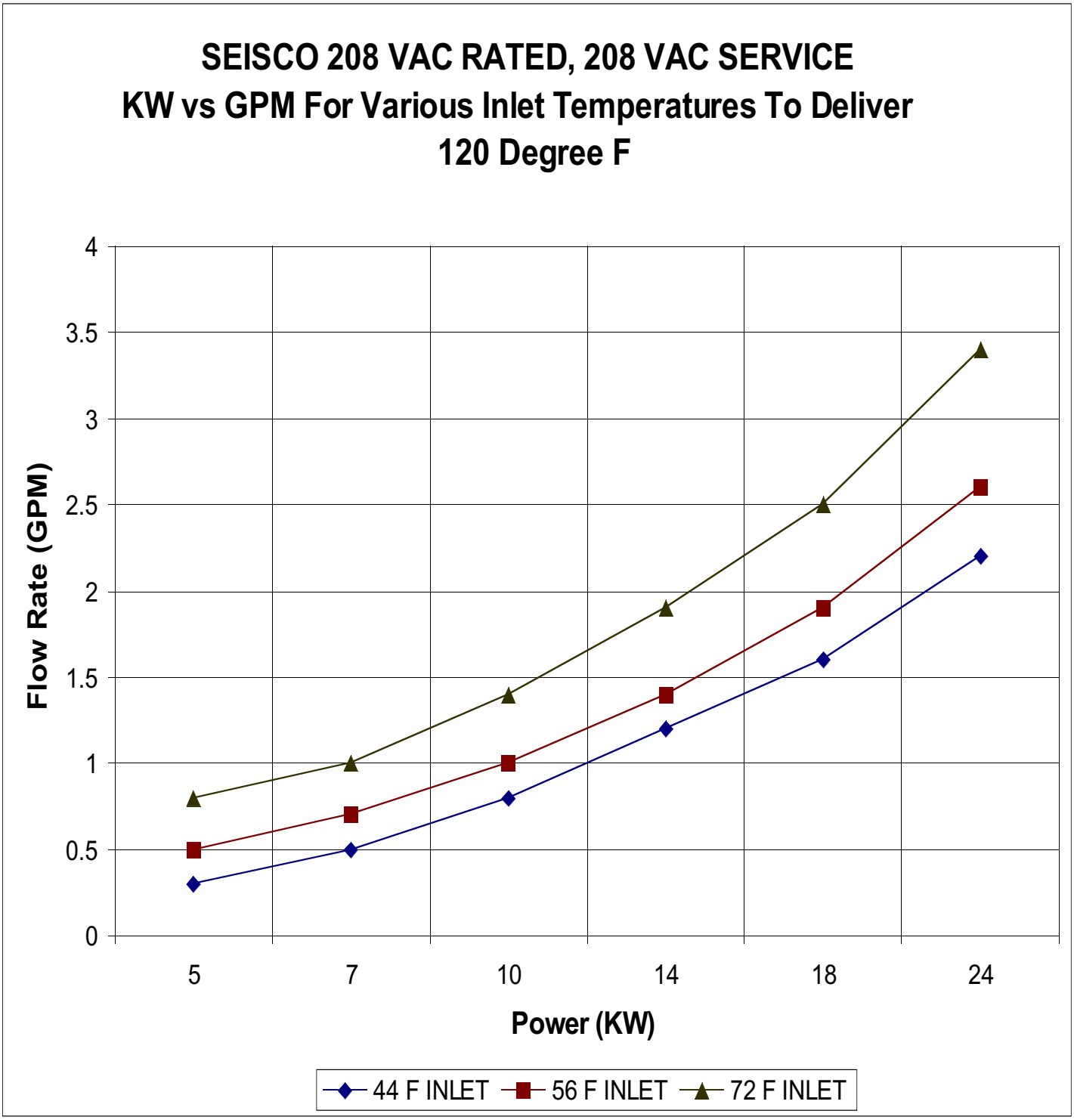
MODEL	RA-28	RA-22	RA-18
kW	24	20	16
Elements	6000 watts × 4	5000 watts × 4	4000 watts × 4
Btu/hr	81910	68260	56600
kg-cal/min	342	285	236
TEMPERATURE RISE			
	81 ¡F @ 2.0 GPM 65 ¡F @ 2.5 GPM 54 ¡F @ 3.0 GPM 30 ¡F @ 4.0 GPM	64 ¡F @ 2.0 GPM 51 ¡F @ 2.5 GPM 42 ¡F @ 3.0 GPM 31 ¡F @ 4.0 GPM	52 ¡F @ 2.0 GPM 42 ¡F @ 2.5 GPM 34 ¡F @ 3.0 GPM 25 ¡F @ 4.0 GPM
	42 ¡C @ 8 L/min 34 ¡C @ 10 L/min 27 ¡C @ 12 L/min 21 ¡C @ 16 L/min	33 ¡C @ 8 L/min 26 ¡C @ 10 L/min 22 ¡C @ 12 L/min 17 ¡C @ 16 L/min	27 ¡C @ 8 L/min 22 ¡C @ 10 L/min 18 ¡C @ 12 L/min 13 ¡C @ 16 L/min
ELECTRICAL			
V	208	208	208
A (max)	115	96	77
Hz	50 / 60	50 / 60	50 / 60
Circuits	30A _ 4	50A _ 2	40A _ 2

[TWO CHAMBER MODELS]

MODEL	RA-14	RA-11	RA-9
kW	12	10	8
Elements	6000 watts × 2	5000 watts × 2	4000 watts × 2
Btu/hr	40950	34130	27300
kg-cal/min	171	142	114
TEMPERATURE RISE			
	81 ¡F @ 1.0 GPM 54 ¡F @ 1.5 GPM 41 ¡F @ 2.0 GPM 32 ¡F @ 2.5 GPM	64 ¡F @ 1.0 GPM 42 ¡F @ 1.5 GPM 31 ¡F @ 2.0 GPM 25 ¡F @ 2.5 GPM	52 ¡F @ 1.0 GPM 34 ¡F @ 1.5 GPM 25 ¡F @ 2.0 GPM 20 ¡F @ 2.5 GPM
	42 ¡C @ 4 L/min 28 ¡C @ 6 L/min 21 ¡C @ 8 L/min 17 ¡C @ 10 L/min	33 ¡C @ 4 L/min 22 ¡C @ 6 L/min 17 ¡C @ 8 L/min 13 ¡C @ 10 L/min	27¡C @ 4 L/min 18 ¡C @ 6 L/min 13 ¡C @ 8 L/min 11 ¡C @ 10 L/min
ELECTRICAL			
V	208	208	208
A (max)	58	48	38.5
Hz	50 / 60	50 / 60	50 / 60
Circuits	30A _ 2	50A _ 1	40A _ 1


SEISCO 240 VAC RATED, 240 VAC SERVICE
KW vs GPM Curves For Various Inlet Temperatures To Deliver 120 Degree F
Flow Rate (GPM)
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
9
11
14
18
22
28
Power (KW)
44 F INLET
56 F INLET
72 F INLET


SEISCO 240 VAC RATED, 208 VAC SERVICE
KW vs GPM For Various Inlet Temperatures To Deliver
120 Degree F
Flow Rate (GPM)
3.5
3
2.5
2
1.5
1
0.5
0
6.75
8.25
10.5
13.5
16.5
21
Power (KW)
44 F INLET
56 F INLET
72 F INLET


SEISCO 208 VAC RATED, 208 VAC SERVICE
KW vs GPM For Various Inlet Temperatures To Deliver
120 Degree F
Flow Rate (GPM)
4
3.5
3
2.5
2
1.5
1
0.5
0
5
7
10
14
18
24
Power (KW)
44 F INLET
56 F INLET
72 F INLET