



**SEISCO  
ELECTRICAL SERVICE REQUIREMENTS  
&  
SAMPLE LOAD CALCULATIONS**

- A. Introduction to SEISCO Electrical Requirements**
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## A. Introduction to Seisco Electrical Requirements

The Seisco is a flow-through electric water heater that generally requires more power (kW) to operate than an electric storage tank heater. The trade-off of using more power to heat with the Seisco, only as it is needed, proves to be a better alternative to using less power while heating a storage tank heater, whether you need it or not. The energy savings associated with the flow-through (or on-demand) technology of the Seisco versus storage tank heating is discussed in the *Cost Comparison* section of this manual.

Like most electric storage tank water heaters, the Seisco heater requires 240 volts (AC) (or 208 VAC) to operate. Several Seisco heaters require multiple double pole circuits and breakers (see the chart below for 240 volt electrical ratings and requirements). Ratings for 208 volt commercial service and 208 volt ratings can be found in the *Product Description & Specification* section of this manual.

**CHART - SEISCO ELECTRICAL RATINGS**

Seisco Model	Maximum Power Rating (kW)	Voltage Rating (VAC)	Maximum Current Rating (Amps)	Number of Circuits (Two Wire)	Number of Circuit Breakers (Double Pole)	Circuit Breaker Size (Amps)
RA-9	9	240	37.5	1	1	40
RA-11	11	240	46	1	1	50
RA-14	14	240	58	2	2	30
RA-18	18	240	75	2	2	40
RA-22	22	240	91	2	2	50
RA-28	28	240	116	4	4	30

### Electrical Service:

The Seisco heater is considered a **non-continuous heating appliance** according to the definitions in the National Electric Code, sections NEC 410 and 411. An appliance load that is not continuous for 3 hours or more is considered non-continuous. The Seisco heater, when used for standard domestic hot water applications, is considered a non-continuous heating appliance. Due to the diversity of water heating in a home, the load (amps) contribution of the Seisco heater to the overall service load of the home or building can be calculated using the optional methods of National Electrical Code, sections NEC 220-30 or 220-31. The methods and rules for calculating these loads can be found in the following section of this manual under **B. National Electric Code Rules – Load Calculations**.

For new dwellings, the service load should be calculated using NEC 220-30. For existing dwellings, the service load should be calculated using NEC 220-31. By both calculation methods, the Seisco load is generally added to the service load at 40% of its maximum nameplate rating. For instance, the maximum current (amp) rating of the Seisco Model RA-28 is 116 amps and 40% of this rating is about 47 amps. The 47 amps is typically the load added to the overall service load of the dwelling when using the optional calculation methods as described in NEC 220-30 and 220-31, not the maximum current rating, 116 amps. As a result, the Seisco Model RA-28 will fit in most homes up to 3000 square feet that have a 200 amp whole-house electrical service. Also, it is important to refer to the Seisco Product Specifications for flow rate and temperature rise ratings of each model before selecting the Seisco(s) for a home or building.

### Power/Voltage Modulation:

During operation, the Seisco heater is designed to use only the power necessary to heat the water for various combinations of temperature rise and flow rate. Also, it is designed to distribute the power evenly to its heating elements. This is called the “Power Sharing” technology and is patented by Seisco.

The on-board microprocessor control of the Seisco determines the temperature rise and flow rate through its temperature sensors mounted on the heating chamber. The control then staggers the application of power to the heating elements using voltage modulation. The result is a smooth and efficient use of power to heat the water. This advanced control technology is extremely important in eliminating light flicker and fluctuations within the home or building. Also, the Seisco heater will use only about 40 to 60% of its power rating for most domestic water heating applications in a home, such as a standard shower, bath or kitchen sink. The Seisco heater may use more power when heating water for multiple tasks or for higher flow faucets, such as bath tub and washing machine faucets.

### **Disconnects and Sub-panels:**

Electrical **disconnect devices** do not contain circuit breakers and are not required by the National Electrical Code (NEC) for residential appliances such as the Seisco water heater or any appliance rated less than 300 volts. However, disconnects may be required by the NEC for motor loads and for appliances with multiple circuits in commercial applications. The Seisco water heater does not contain any motors, but some models require multiple circuits and circuit breakers. A disconnect may be required for the Seisco in commercial applications.

Electrical **sub-panels**, containing circuit breakers, may be used with appliances such as the Seisco water heater in residential and commercial applications. Particularly for the models requiring multiple circuits, which are models RA-14, RA-18, RA-22 and RA-28 (see previous Chart – Seisco Electrical Ratings in this section).

In new residential construction, there is generally enough breaker spaces in the main electrical panel to accommodate multiple circuit breakers for the Seisco heater. However, in existing homes, the main electrical panel may be nearly full with circuit breakers serving existing load. In these cases, a single large breaker, rated for the entire load of the Seisco heater, can be installed at the main panel. From the main panel, a single circuit or sub-feed is installed to a sub-panel where the appropriate number of circuit breakers can be installed for the Seisco heater. Refer to the “Electrical Wiring & Breaker Guides” in this section for options that can be used to serve various Seisco Models requiring multiple circuits.

### **Branch Circuits and Breakers:**

As a non-continuous heating appliance, the branch circuit wires and breakers must be sized to 100% of the maximum ampere rating of the appliance. It is recommended that the wire and breakers of the branch circuits and sub-feeds be rated for at least 75 degrees C. This is particularly important to avoid over heating of the wires at the connections to the breakers. Over heating at the breaker connections may cause nuisance or premature breaker trips. Refer to **D. National Electrical Code Rules – Branch Circuit Protection** in this section of the Seisco Product Manual for further detail and explanation.

### **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 common 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.

## B. National Electrical Code Rules – Load Calculations

### C. Optional Calculations for Computing Feeder and Service Loads

#### 220-30. Optional Calculation New Dwelling Unit

(a) Feeder and Service Load. For a dwelling unit having the total connected load served by a single 3-wire, 120/240-volt or 208Y/120-volt set of service-entrance or feeder conductors with an ampacity of 100 or greater, it shall be permissible to compute the feeder and service loads in accordance with this section instead of the method specified in Part B of this article. The calculated load shall be the result of adding the loads from (b) and (c). Feeder and service-entrance conductors whose demand load is determined by this optional calculation shall be permitted to have the neutral load determined by Section [220-22](#).

**(b) General Loads. The general calculated load shall be not less than 100 percent of the first 10 kVA plus 40 percent of the remainder of the following loads:**

1. 1500 volt-amperes for each 2-wire, 20-ampere small-appliance branch circuit and each laundry branch circuit specified in Section [220-16](#)
  2. 3 volt-amperes per square foot (0.093 m<sup>2</sup>) for general lighting and general-use receptacles
  3. The nameplate rating of all appliances that are fastened in place, permanently connected, or located to be on a specific circuit, ranges, wall-mounted ovens, counter-mounted cooking units, clothes dryers, and **water heaters**
  4. The nameplate ampere or kVA rating of all motors and of all low-power-factor loads
- (c) Heating and Air-Conditioning Load. Include the largest of the following six selections (load in kVA).

1. 100 percent of the nameplate rating(s) of the air conditioning and cooling.
2. 100 percent of the nameplate ratings of the heat pump compressors and supplemental heating unless the controller prevents the compressor and supplemental heating from operating at the same time.
3. 100 percent of the nameplate ratings of electric thermal storage and other heating systems where the usual load is expected to be continuous at the full nameplate value. Systems qualifying under this selection shall not be calculated under any other selection in (c).
4. 65 percent of the nameplate rating(s) of the central electric space heating, including integral supplemental heating in heat pumps where the controller prevents the compressor and supplemental heating from operating at the same time.
5. 65 percent of the nameplate rating(s) of electric space heating if less than four separately controlled units.
6. 40 percent of the nameplate rating(s) of electric space heating if four or more separately controlled units.

#### 220-31. Optional Calculation for Additional Loads in Existing Dwelling Unit

For an existing dwelling unit presently being served by an existing 120/240-volt or 208Y/120-volt, 3-wire service, it shall be permissible to compute load calculations as follows:

Load (kVa)	Percent of Load
First 8 kVA of load at	100
Remainder of load at	40

Load calculations shall include lighting at 3 volt-amperes/ft<sup>2</sup> (0.093 m<sup>2</sup>); 1500 volt-amperes for each 2-wire, small-appliance branch circuit and each laundry branch circuit as specified in Section [220-16](#); range or wall-mounted oven and counter-mounted cooking unit; and other appliances that are permanently connected or fastened in place, at nameplate rating.

If air-conditioning equipment or electric space-heating equipment is to be installed, the following formula shall be applied to determine if the existing service is of sufficient size.

<b>Air-conditioning equipment*</b>	<b>100%</b>
<b>Central electric space heating*</b>	<b>100%</b>
<b>Less than four separately controlled space-heating units*</b>	<b>100%</b>
<b>First 8 kVA of all other loads</b>	<b>100%</b>
<b>Remainder of all other loads</b>	<b>40%</b>

\*Use larger connected load of air conditioning and space heating, but not both.

Other loads shall include the following:

1. 1500 volt-amperes for each 20-ampere appliance circuit
2. Lighting and portable appliances at 3 volt-amperes/ft<sup>2</sup> (0.093 m<sup>2</sup>)
3. Household range or wall-mounted oven and counter-mounted cooking unit
4. All other appliances fastened in place, including four or more separately controlled space-heating units, at nameplate rating

**C. Sample Residential Load Calculation – 3800 S.F. Home\***

(\*All electric home with a SEISCO RA-28)

<b>Feeder or Service Load - Optional 220-30</b>			
<b>Dwelling with RA-28 Seisco Water Heater</b>			
Dwelling with range (12kW), dishwasher (1.2kVA) , clothes dryer (5kW) , and two air conditioners, one 3.5ton, 12 SEER, 17.9A + 3.3A air handler; one 3.0 ton, 12SEER, A + A air handler.			
120/240V Service			
<b>Dwelling Area (Sq. ft.)</b>		<b>3800</b>	<b>Square Feet</b>
<b>Seisco water heater</b>		<b>RA-28</b>	
		Line VA	
<b>Lighting</b>	3VA/sq.ft.x Area	11400	
<b>Appliance</b>	2x1500VA	3000	
<b>Laundry</b>	1500VA	1500	
	Subtotal (VA)	15900	<b>VA</b>
<b>Range</b>	12kW	12000	
<b>Water Heater</b>	28kW	28000	
<b>Dishwasher</b>	1.2kVA	1200	
<b>Dryer</b>	5kW	5000	
	Total Other Load (VA)	62100	<b>VA</b>
	Demand Factors		
	10kW @ 100%	10000	
	Remainder at 40%	20840	
3.5 Ton A/C	AC 240V x 21.2A	5088	
3.5 Ton A/C	AC 240V x 21.2A	5088	
	<b>Service Load (VA)</b>	41016	<b>VA</b>
	<b>Current (A)</b>	170.9	<b>A</b>
	<b>Service Panel</b>	200A	
Notes:			
	Load of Seisco RA-28 is 40% (VA)	11200	

### C. Sample Residential Load Calculation – 3800 S.F. Home\*

(\*All Electric Home with a SEISCO RA-28)

<b>Feeder or Service Load - Optional 220-30</b>			
<b>Dwelling with RA-28 Seisco Water Heater</b>			
Dwelling with range (12kW), dishwasher (1.2kVA) , clothes dryer (5kW), and two air conditioners, each (3.5 ton, 12 SEER, 21.2A plus 10kW strip heater), 120/240V Service			
<b>Dwelling Area (Sq. ft.)</b>		<b>3800</b>	<b>Square Feet</b>
<b>Seisco water heater</b>		<b>RA-28</b>	
		Line VA	
<b>Lighting</b>	3VA/sq.ft.xArea	11400	
<b>Appliance</b>	2x1500VA	3000	
<b>Laundry</b>	1500VA	1500	
	Subtotal(VA)	15900	<b>VA</b>
<b>Range</b>	12kW	12000	
<b>Water Heater</b>	28kW	28000	
<b>Dishwasher</b>	1.2kVA	1200	
<b>Dryer</b>	5kW	5000	
	Total OtherLoad (VA)	62100	<b>VA</b>
	Demand Factors		
	10kW @ 100%	10000	
	Remainderat 40%	20840	
3.5 Ton A/C	240V x (21.2+41.6)A	15072	
3.5 Ton A/C	240V x (21.2+41.6)A	15072	
	<b>Service Load (VA)</b>	60984	<b>VA</b>
	<b>Current (A)</b>	254.1	<b>A</b>
	<b>Service Panels</b>	200A+100A	
Notes:			
	Load ofSeisco RA-28 is 40% (VA)	11200	

### C. Sample Residential Load Calculations – 2000 S.F. Home\*

(\*All Electric Home with various SEISCO Heaters, RA-14, RA-22 & RA-28)

<b>Dwelling Feeder or Service Load - Optional 220-30</b>				
<b>Comparing Seisco Water heater Loads</b>				
Dwelling with range (12kW), dishwasher (1.2kVA), clothes dryer (5kW), and air conditioner (3.5 ton, 12 SEER, 17.9A + 3.3A air handler), 120/240V service				
<b>Dwelling Area (Sq. ft.)</b>				
		<b>2000</b>	<b>Square Feet</b>	
<b>Seisco water heater</b>		<b>RA-14</b>	<b>RA-22</b>	<b>RA-28</b>
		Line VA	Line VA	Line VA
<b>Lighting</b>	3VA/sq. ft.xArea	6000	6000	6000
<b>Appliance</b>	2x1500VA	3000	3000	3000
<b>Laundry</b>	1500VA	1500	1500	1500
Subtotal		10500	10500	10500
<b>Range</b>	12kW	12000	12000	12000
<b>Water Heater</b>	Seisco RA-14/RA-22/RA-28	14000	22000	28000
<b>Dishwasher</b>	1.2kVA	1200	1200	1200
<b>Dryer</b>	5kW	5000	5000	5000
Total Other Load		42700	50700	56700
Application of Demand Factors				
10kW @ 100%		10000	10000	10000
Remainder at 40%		13080	16280	18680
<b>3.5 Ton A/C</b>	AC 240V x 21.2A	5088	5088	5088
<b>Service Load (VA)</b>		28168	31368	33768
<b>Current (A)</b>		117.4	130.7	140.7
Use		125A	150A	150A
Notes:	Load of Seisco water heater is 40%	5600	8800	11200



**C. Sample Residential Load Calculation – 2000 S.F. Home\***

(\* All Electric Home with a SEISCO RA-28)

<b>Feeder or Service Load - Optional 220-30 Dwelling with RA-28 Seisco Water Heater</b>			
Dwelling with range (12kW), dishwasher (1.2kVA) , clothes dryer (5kW) and air conditioner (3.5 ton, 12 SEER, 21.2A + 10kW strip heater),120/240V Service			
<b>Dwelling Area (Sq. ft.)</b>	<b>2000</b>	<b>Square Feet</b>	
<b>Seisco water heater</b>	<b>RA-28</b>		
	Line VA		
<b>Lighting</b>	3VA/sq.ft x Area	6000	
<b>Appliance</b>	2x1500VA	3000	
<b>Laundry</b>	1500VA	1500	
	Subtotal (VA)	10500	<b>VA</b>
<b>Range</b>	12kW	12000	
<b>Water Heater</b>	28kW	28000	
<b>Dishwasher</b>	1.2kVA	1200	
<b>Dryer</b>	5kW	5000	
	Total Other Load (VA)	56700	<b>VA</b>
	Demand Factors		
	10kW @ 100%	10000	
	Remainder at 40%	18680	
3.5 Ton AC	240V X (21.2+41.6)A	15072	
	<b>Service Load (VA)</b>	43752	<b>VA</b>
	<b>Current (A)</b>	182.3	<b>A</b>
	<b>Service Panel</b>	200A	
Notes:			
	Load of Seisco RA-28 is 40% (VA)	11200	

**C. Sample Residential Load Calculations – 1600 S.F. Home\***

(All Electric Home with various SEISCO Models, RA-14, RA-22 &amp; RA-28)

<b>Dwelling Feeder or Service Load - Optional 220-30</b>				
<b>Comparing Seisco Water Heater Loads</b>				
Dwelling with range (12kW), dishwasher (1.2kVA), clothes dryer (5kW) and air conditioner (3.5 ton, 12 SEER, 17.9A + 3.3A air handler), 120/240V service				
<b>Dwelling Area (Sq. ft.)</b>		<b>1600</b>	<b>Square Feet</b>	
<b>Seisco water heater</b>		<b>RA-14</b>	<b>RA-22</b>	<b>RA-28</b>
		Line VA	Line VA	Line VA
<b>Lighting</b>	3VA/sq. ft.xArea	4800	4800	4800
<b>Appliance</b>	2x1500VA	3000	3000	3000
<b>Laundry</b>	1500VA	1500	1500	1500
	Subtotal	9300	9300	9300
<b>Range</b>	12kW	12000	12000	12000
<b>Water Heater</b>	Seisco RA-14/RA-22/RA-28	14000	22000	28000
<b>Dishwasher</b>	1.2kVA	1200	1200	1200
<b>Dryer</b>	5kW	5000	5000	5000
	Total Other Load	41500	49500	55500
	Application of Demand Factors			
	10kW @ 100%	10000	10000	10000
	Remainder at 40%	12600	15800	18200
	AC 240V x 21.2A	5088	5088	5088
	<b>Service Load (VA)</b>	27688	30888	33288
	<b>Current (A)</b>	115.4	128.7	138.7
	Use	125A	150A	150A
Notes:	Load of Seisco RA-28 is 40%	5600	8800	11200

**C. Sample Residential Load Calculation – 1600 S.F. Home\***

(\*All Electric Home with a SEISCO RA-28)

<b>Feeder or Service Load - Optional 220-30</b>			
<b>Dwelling with Seisco RA-28 Water Heater</b>			
Dwelling with range (12kW), dishwasher (1.2kVA) , clothes dryer (5kW), and air conditioner (3.5 ton, 12 SEER, 21.2A + 10kW strip heater), 120/240V Service			
<b>Dwelling Area (Sq. ft.)</b>	<b>1600</b>	<b>Square Feet</b>	
<b>Seisco water heater</b>	<b>RA-28</b>		
	Line VA		
<b>Lighting</b>	3VA/sq.ft.xArea	4800	
<b>Appliance</b>	2x1500VA	3000	
<b>Laundry</b>	1500VA	1500	
	Subtotal (VA)	9300	<b>VA</b>
<b>Range</b>	12kW	12000	
<b>Water Heater</b>	Seisco RA-28	28000	
<b>Dishwasher</b>	1.2kVA	1200	
<b>Dryer</b>	5kW	5000	
	Total Other Load (VA)	55500	<b>VA</b>
	Demand Factors		
	10kW @ 100%	10000	
	Remainder at 40%	18200	
3.5 Ton AC	240V X (21.2+41.6)A	15072	
	<b>Service Load (VA)</b>	43272	<b>VA</b>
	<b>Current (A)</b>	180.3	<b>A</b>
	<b>Service Panel</b>	200A	
Notes:			
	Load of Seisco RA-28 is 40% (VA)	11200	

## D. National Electrical Code Rules – Branch Circuit Protection

### 422-10. Branch-Circuit Rating

This section specifies the ratings of branch circuits capable of carrying appliance current without overheating under the conditions specified.

(a) Individual Circuits. The rating of an individual branch circuit shall not be less than the marked rating of the appliance or the marked rating of an appliance having combined loads as provided in Section [422-62](#).

The rating of an individual branch-circuit for motor-operated appliances not having a marked rating shall be in accordance with Part B of [Article 430](#).

The branch-circuit rating for an appliance that is continuously loaded, other than a motor-operated appliance, shall not be less than 125 percent of the marked rating; or not less than 100 percent of the marked rating if the branch-circuit device and its assembly are listed for continuous loading at 100 percent of its rating.

**NOTE: The SEISCO is not continuous!!**

Continuous Load. A load where the maximum current is expected to continue for 3 hours or more.

### 422-11. Overcurrent Protection

Appliances shall be protected against overcurrent in accordance with (a) through (g) and Section [422-10](#).

(a) Branch-Circuit Overcurrent Protection. Branch circuits shall be protected in accordance with Section [240-3](#).

If a protective device rating is marked on an appliance, the branch-circuit overcurrent device rating shall not exceed the protective device rating marked on the appliance.

#### **(f) Electric Heating Appliances Employing Resistance-Type Heating Elements Rated More than 48 Amperes.**

1. Electric heating appliances employing resistance-type heating elements rated more than 48 amperes, other than household appliances with surface heating elements covered by Section [422-11\(b\)](#), and commercial-type heating appliances covered by Section [422-11\(d\)](#), shall have the heating elements subdivided. **Each subdivided load shall not exceed 48 amperes and shall be protected at not more than 60 amperes.**

..

2. Commercial kitchen and cooking appliances

**3. Water heaters and steam boilers employing resistance-type immersion electric heating elements contained in an ASME-rated and stamped vessel shall be permitted to be subdivided into circuits not exceeding 120 amperes and protected at not more than 150 amperes.**

**For example, the RA-28 with 7000w elements can draw 29 amperes at 240volts. Thus, under the 1999 NEC the heater requires 4 - 30 ampere circuits. That will change with the 2001 NEC.**

**422-47. Water Heater Controls**

All storage or instantaneous-type water heaters other than

(a) Storage water heaters that are identified as being suitable for use with supply water temperature of 82...C (180...F) or above and a capacity of 60 kW or above, or

**(b) Instantaneous-type water heaters that are identified as being suitable for such use, with a capacity of 1 gal (3.785 L) or less shall be equipped with a temperature-limiting means in addition to its control thermostat to disconnect all ungrounded conductors, and such means shall be (1) installed to sense maximum water temperature and (2) be either a trip-free, manually reset type or a type having a replacement element. Such water heaters shall be marked to require the installation of a temperature and pressure relief valve.**

FPN: See Relief Valves and Automatic Gas Shutoff Devices for Hot Water Supply Systems, ANSI Z21.22-1986.

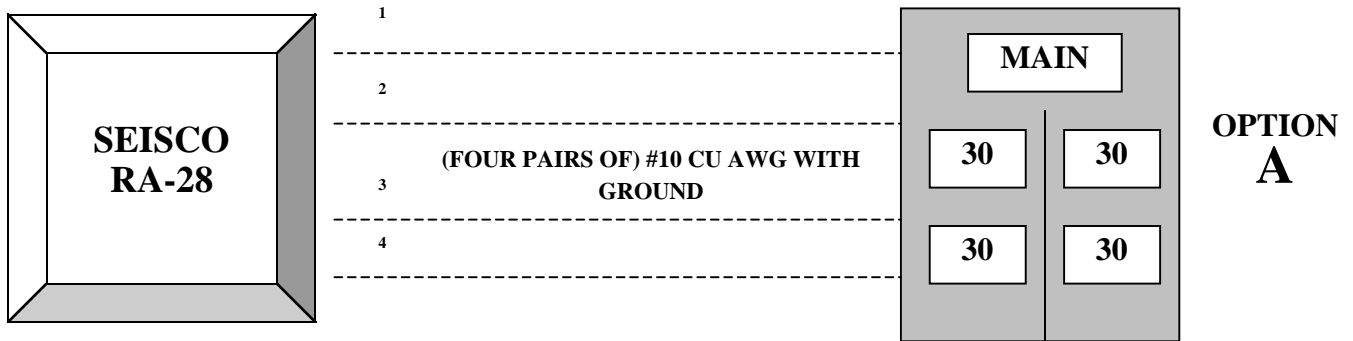
**NOTE: No pressure relief valve required according to the NEC**

**Table 310-16. Allowable Ampacities of Insulated Conductors Rated 0 Through 2000 Volts, 60...C Through 90...C (140...F Through 194...F) Not More than Three Current-Carrying Conductors in Raceway, Cable, or Earth (Directly Buried), Based on Ambient Temperature of 30...C (86...F)**

Size	Temperature Rating of Conductor (See Table 310-13)						Size
	60...C (140...F)		75...C (167...F)		90...C (194...F)		
AWG or kcmil	Types TW, UF	Types FEPW, RH, RHW, THHW, THW, THWN, XHHW, USE, ZW	Types TBS, SA, SIS, FEP, FEPB, MI, RHH, RHW-2, THHN, THHW, THW-2, THWN-2, USE-2, XHH, XHHW, XHHW-2, ZW-2	Types TW, UF	Types RH, RHW, THHW, THW, THWN, XHHW, USE	Types TBS, SA, SIS, THHN, THHW, THW- 2, THWN-2, RHH, RHW-2, USE-2, XHH< XHHW, XHHW-2, ZW-2	AWG or kcmil
	<b>COPPER</b>			<b>ALUMINUM OR COPPER-CLAD ALUMINUM</b>			
18			14				
16			18				
14*	20	20	25				
12*	25	25	30	20	20	25	12*
<b>10*</b>	<b>30</b>	<b>35</b>	<b>40</b>	<b>25</b>	<b>30</b>	<b>35</b>	<b>10*</b>
8	40	50	55	30	40	45	8
6	55	65	75	40	50	60	6
4	70	85	95	55	65	75	4
3	85	100	110	65	75	85	3
2	95	115	130	75	90	100	2
1	110	130	150	85	100	115	1
1/0	125	150	170	100	120	135	1/0
2/0	145	175	195	115	135	150	2/0
3/0	165	200	225	130	155	175	3/0
4/0	195	230	260	150	180	205	4/0

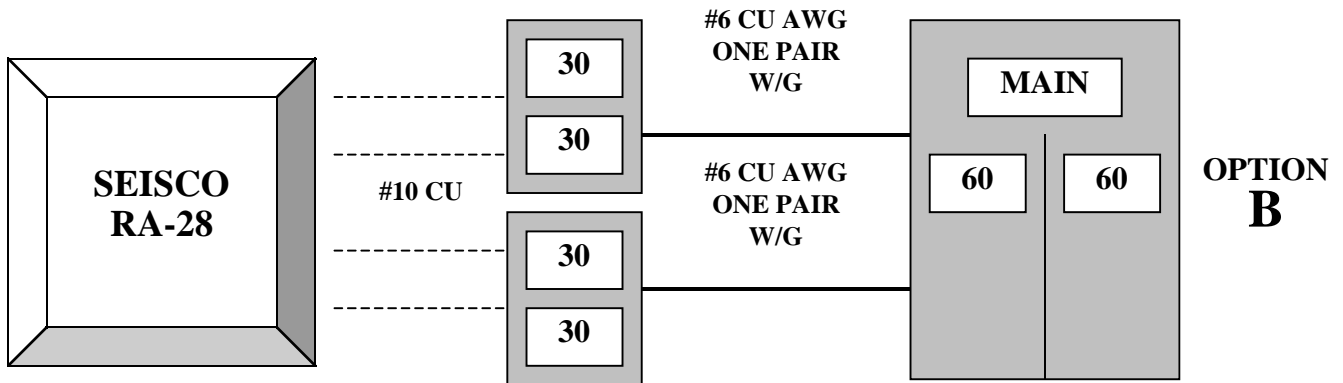
# E. SEISCO® Wiring & Breaker Guide\* (RA-28)

(\* For Nominal 240 Volt Electrical Service)



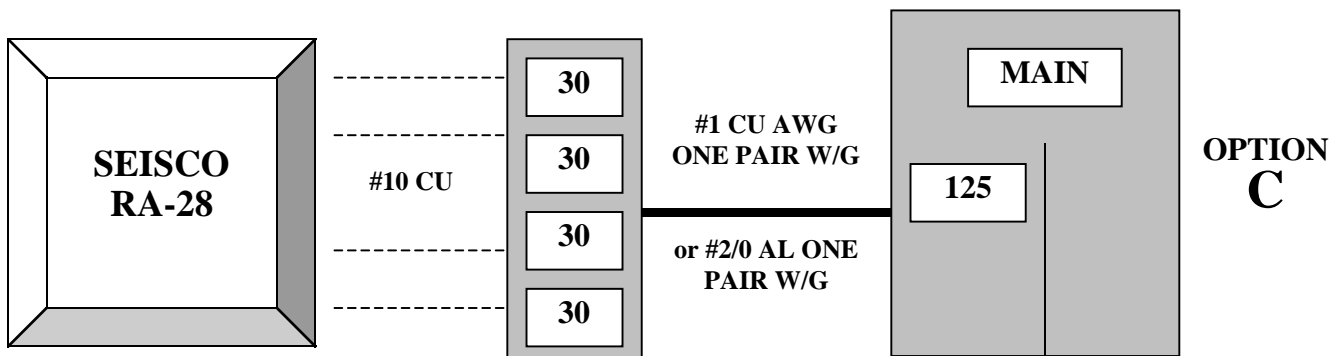
**A** – Main panel requires 8 spaces or four (4) double-pole, 30 amp, 240 volt breaker positions. Breaker lugs must have a 75 deg C rating. A 200 AMP MAIN SERVICE IS RECOMMENDED.

## SUBPANELS



**B** – Main panel requires 4 spaces or two (2) double-pole, 60 amp, 240 volt breaker positions. Breaker lugs must have 75 deg C rating to feed sub-feed, from main panel. A 200 AMP MAIN SERVICE IS RECOMMENDED.

## SUBPANEL



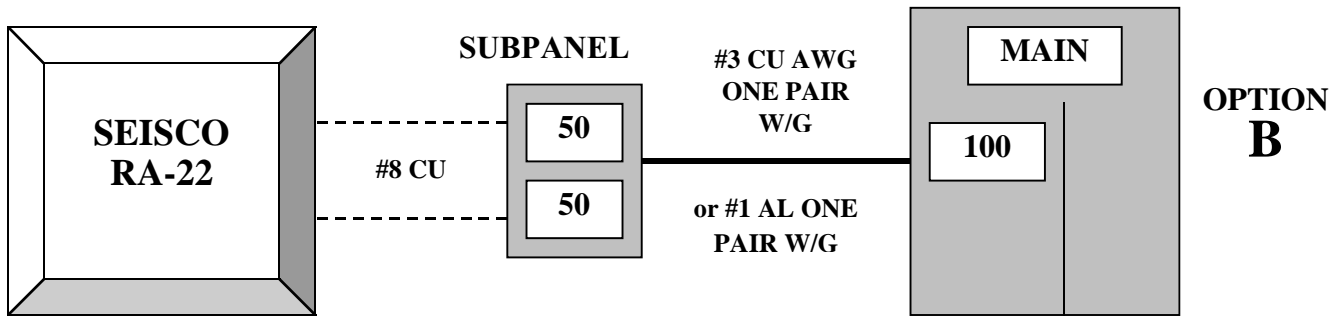
**C** – Main panel requires 2 spaces or one (1) double-pole, 125 amp, 240 volt breaker position. Breaker lugs must have 75 deg C rating to feed sub-feed, from main panel. A 200 AMP MAIN SERVICE IS RECOMMENDED.

## E. SEISCO® Electrical Wiring & Breaker Guide\* (RA-22 & RA-18)

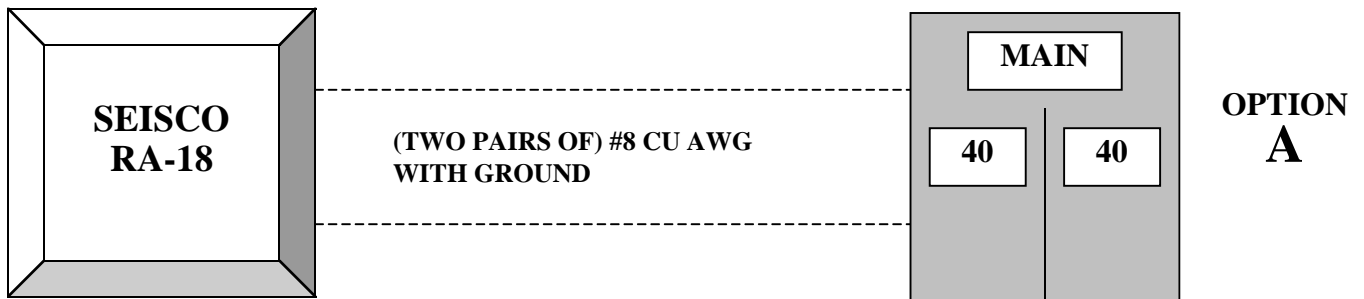
(\* For Nominal 240 Volt Electrical Service)



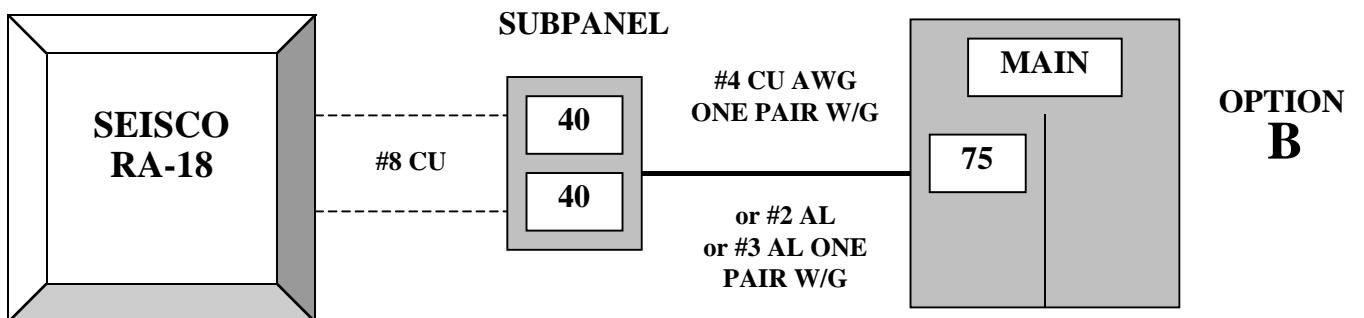
**A** – Main panel requires 4 spaces or two (2) double-pole, 50 amp, 240 volt breaker positions.



**B** – Main panel requires 2 spaces or one (1) double-pole, 100 amp, 240 volt breaker position.



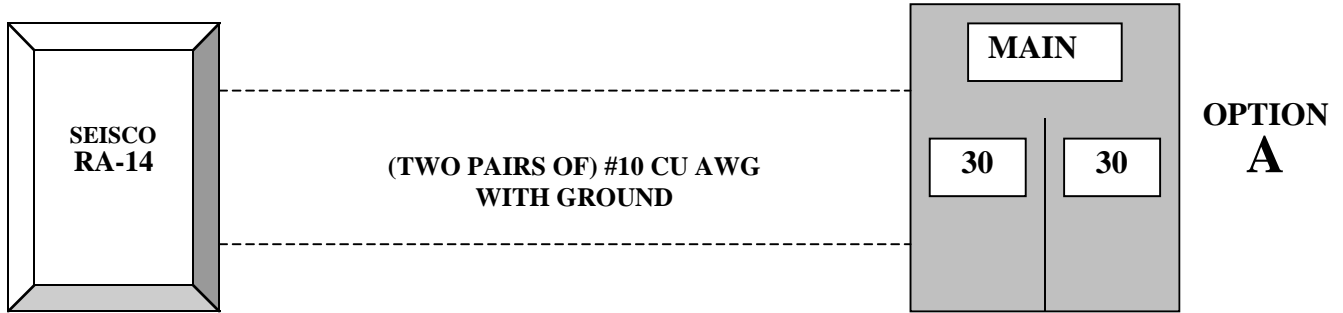
**A** – Main panel requires 4 spaces or two (2) double-pole, 40 amp, 240 volt breaker positions.



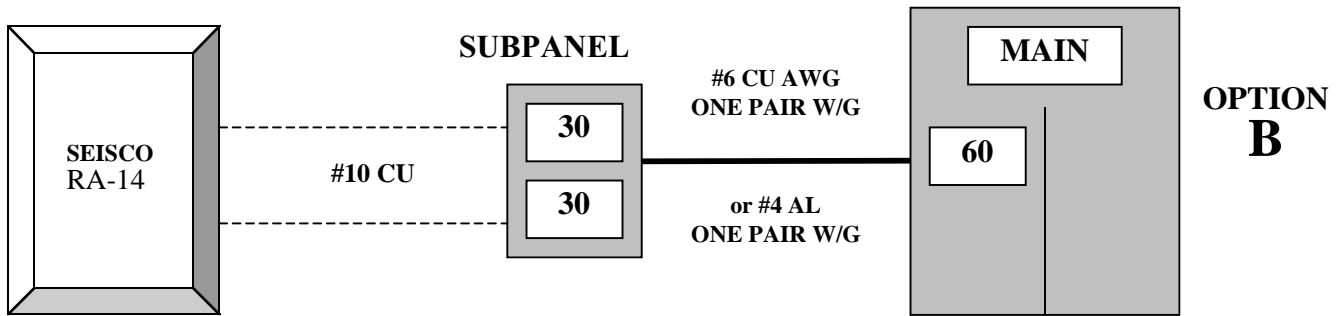
**B** – Main panel requires 2 spaces or one (1) double-pole, 75 amp, 240 volt breaker position.

**E. SEISCO® Electrical Wiring & Breaker Guide\* (RA-14, 11 & 9)**

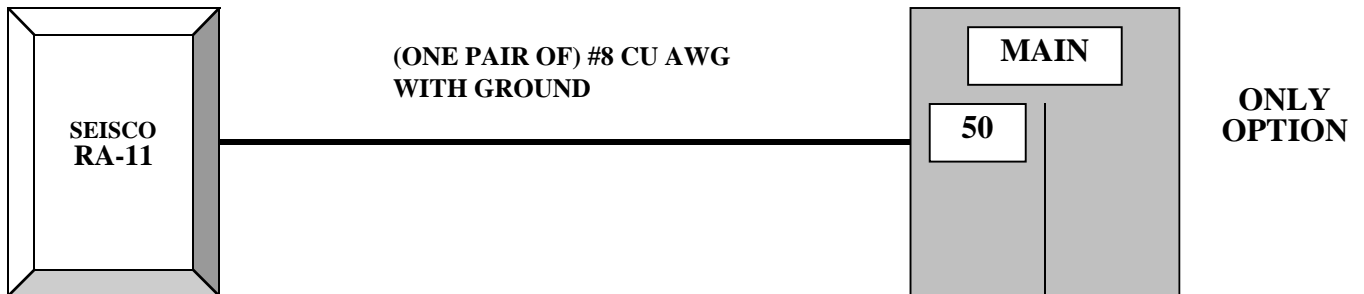
(\* For Nominal 240 Volt Electrical Service)



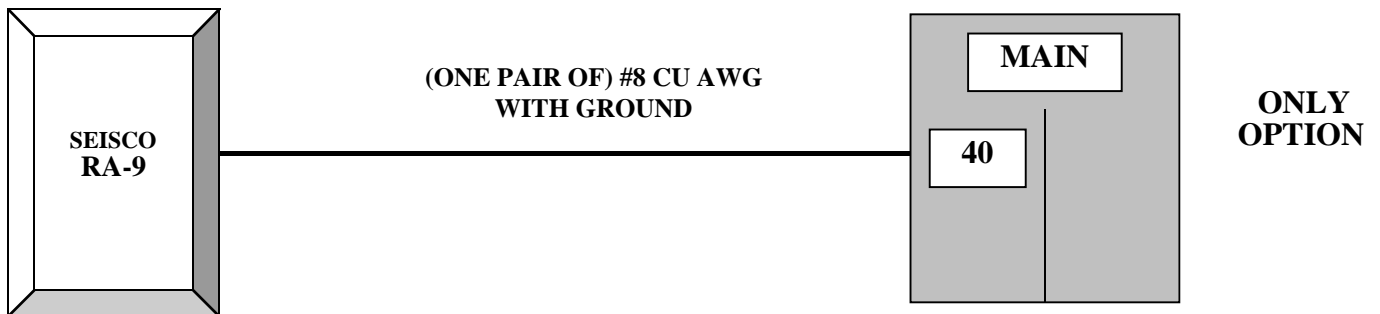
**A** – Main panel requires 4 spaces or two (2) double-pole, 30 amp, 240 volt breaker positions.



**B** – Main panel requires 2 spaces or one (1) double-pole, 60 amp, 240 volt breaker position.



**RA-11** Main panel requires 2 spaces or one (1) double-pole, 50 amp, 240 volt breaker positions.



**RA-9** Main panel requires 2 spaces or one (1) double-pole, 40 amp, 240 volt breaker position.



## F. Single and Three Phase Wiring Diagrams

### Single-Phase Connections:

The Seisco Water Heater was designed for single-phase, 240 volt operation on residential and light commercial electrical services. When properly connected, the load of the Seisco is automatically balanced across both legs (or poles) of the service. It doesn't matter how many circuits the Seisco requires, the load will always be balanced on a single-phase service.

However, the only way the Seisco will work properly, is with both distinct poles or legs connected to each circuit. If the legs making up the circuit are from the same side of the service bus, then they will cancel and the resultant voltage will be zero (0) volts instead of 240 volts. This is usually referred to as "out-of-phase" or simply having the circuit wires crossed or out of sequence. Refer to the **Single-Phase Diagram** that illustrates the correct connections to the single-phase service in this section of the manual.

### Three-Phase Connections:

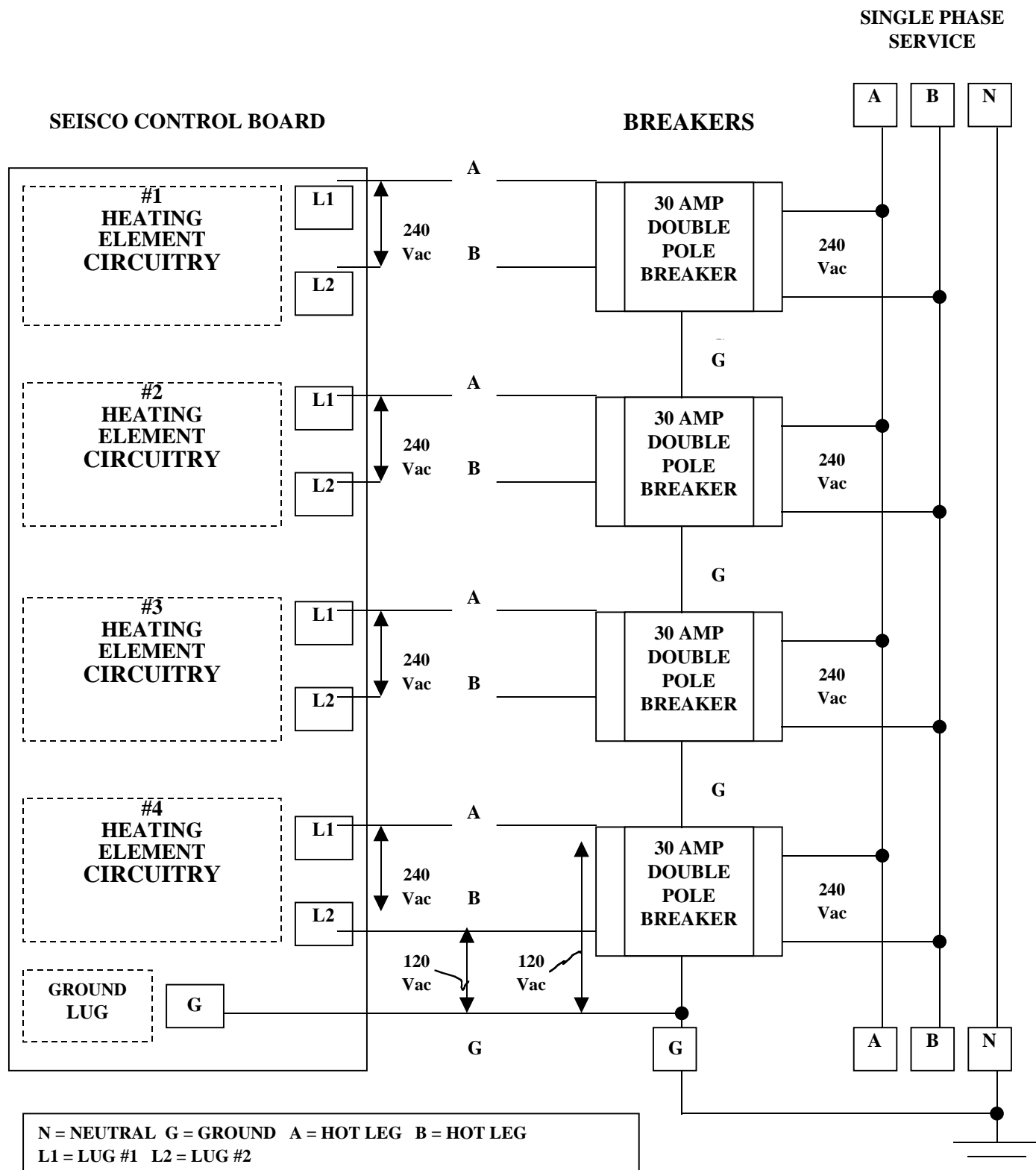
The Seisco heater will operate on 240 or 208 volt three-phase systems, that are commonly used in commercial and industrial buildings. However, the Seisco heater will not work on 480 volt three-phase or 277 volt phase-to-ground services. In three-phase applications, it is recommended to balance the Seisco load as much as possible, particularly, on 208 volt wye services.

Since the Seisco has an even number of heating elements and associated circuits, the load cannot be balanced evenly across a three-phase service. However, it is possible to spread the load across the three phases so that all the load of the Seisco is not on one phase. Refer to the **Three-Phase Diagram** that illustrates proper connections to the three-phase service in this section of the manual.

As shown in the diagram, the Seisco RA-28 requires four (4) 30 amp, double pole 240 or 208 volt circuits. The load of the four circuits can be connected to each phase of a three-phase service. Six of the eight legs from the four circuits can be distributed evenly across the three phases. The remaining two legs have to be connected to two phases, leaving one phase out of balance. In some buildings with three-phase service, there is a lighting load or single phase load that creates an imbalance anyway. So it may be possible to spread the load of the Seisco to the non-lighting load phase, which will help balance the load of the whole building.

# F. Wiring connections to SINGLE PHASE 240 volt systems: SEISCO® Model RA-28

(The RA-28 requires (four) double pole 30 amp circuits)



**F. Wiring connections to 208 or 240 volt THREE-PHASE systems:  
SEISCO® Model RA-28**

(The RA-28 requires (four) double pole 30 amp circuits)

