INSTALLATION AND SERVICE MANUAL

SPACESAVER ELECTRIC BOOSTER HOT WATER HEATERS

MAKE DISHWASHING CLEANER, SAFER AND MORE EFFICIENT
4 kW to 54 kW, 208 Vac to 600 Vac, Single or Three Phase
180ºF instantaneous hot water for commercial dishwashers
Suitable for installation with all "name-brand" dishwashers

WARNING

Risk of electric shock. This unit may be connected to more than one electrical circuit. Disconnect all electrical circuits before servicing.

IMPORTANT

- The booster heater must be installed in accordance with all local codes.
- This manual must be left with owner and should be hung adjacent to the booster heater for reference.
- Ensure booster heater is full of water before turning on electricity. Elements will burn out immediately without water in the booster heater.
- Booster heater voltage must be correct for voltage available. Check nameplate on the booster heater for full information.
- Overcurrent protection between the power supply and the booster heater must be provided in accordance with the related code.
- Always ensure power switch is turned off before servicing.
- Under no circumstances should any electrical wiring or internal controls be touched, except by a qualified electrician or any heating system be adjusted, except by a qualified service technician.

Post these instructions in a visible place.

DATE OF INSTALLATION :

INSTALLED BY :

PHONE :

Manufactured by
Allied Engineering Company
Division of E-Z-Rect Manufacturing Ltd.
Manufacturers of Gas and Electric Boilers, Stainless Steel Tanks, Tankless Coils, Electric Boosters
94 Riverside Drive, North Vancouver, B.C. V7H 2M6 • Telephone (604) 929-1214 • FAX (604) 929-5184
Branches: Calgary • Edmonton • Toronto

(OPTIONAL)

PN5152451

PRICE $6

Dimensions, Piping Diagram and Specifications Section 1

1.1 DIMENSIONS AND PIPING DIAGRAM

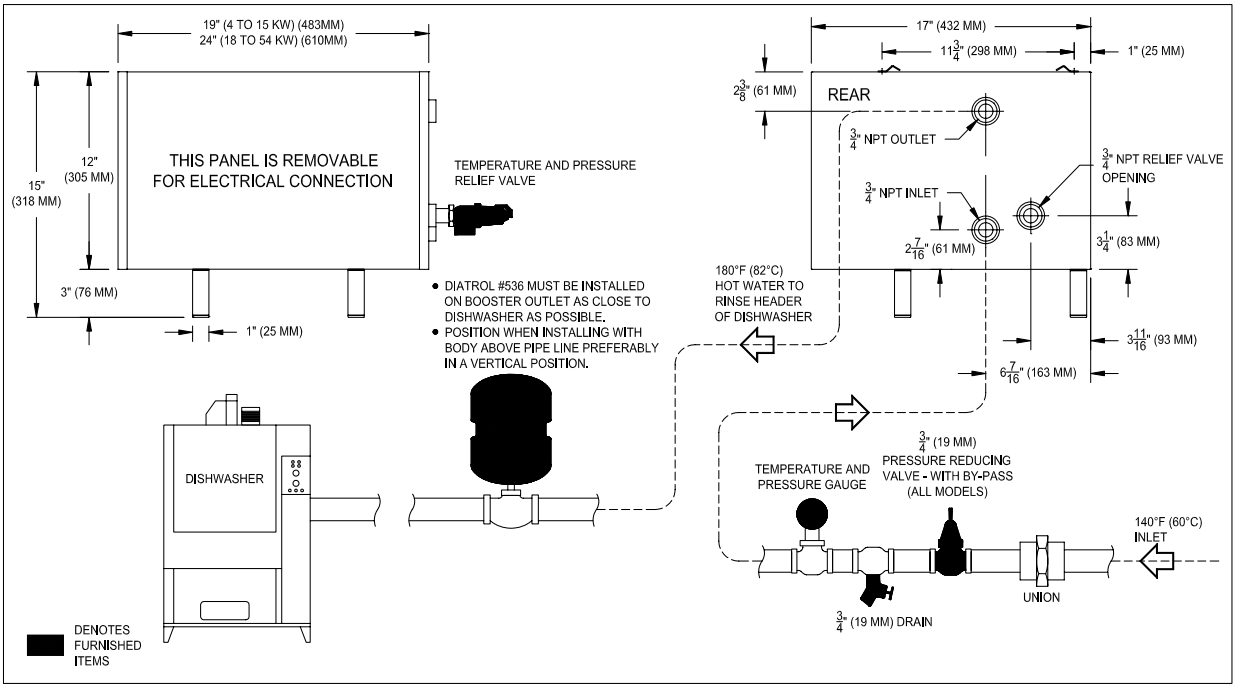

Figure 1 – Dimensions and Piping Diagram

1.2 TECHNICAL SPECIFICATIONS

	CSA
Maximum Operating Pressure	130 p.s.i.
Maximum Operating Water Temperature	210ºF
Water Capacity in boiler – 4-18kW	4.27 US Gallons
Water Capacity in boiler – 24-54kW	5.80 US Gallons
Inlet and Outlet Pipe Size	3/4” NPT

Dimensions, Piping Diagram and Specifications Section 1

TABLE 1. Super Hot Electric Booster Heater Specifications (Flange Type Elements)

BOOSTER MODEL NUMBERS, kW RATINGS AND MAX. AMPERAGE DRAW											
Model Number	kW	Btu/Hr	Tank Capacity U.S. Gal	U.S. Gal./Hr 40°F Rise	Maximum Amperage Draw						Approx. Shipping Weight
					Single Phase		Three Phase				
					208	240	208	240	480	600	
304B	4	13,649	4.27	41	19.2	16.7	--	--	--	--	60 LBS
305B	5	17.062	4.27	52	24.0	20.8	--	--	--	--	60 LBS
306B	6	20,474	4.27	62	28.8	25.0	16.6	14.4	7.2	5.8	60 LBS
307B	7	23,884	4.27	72	33.7	29.2	21.0*	18.2*	9.1*	7.3*	60 LBS
309B	9	30,711	4.27	93	43.3	37.5	25.0	21.6	10.8	8.7	60 LBS
312B	12	40,948	4.27	124	57.7	50.0	33.3	28.8	14.4	11.5	65 LBS
313B	13	44,356	4.27	135	62.5	54.2	37.6*	32.6*	16.3*	13.0*	65 LBS
315B	15	51,185	4.27	156	72.1	62.5	46.4*	40.2*	20.1*	16.1*	65 LBS
318B	18	61,422	4.27	187	86.5	75.0	54.6*	47.3*	23.7*	18.9*	70 LBS
424B	24	81,895	5.80	249	115	100	66.5	57.7	28.8	23.1	70 LBS
427B	27	92,124	5.80	280	130	113	74.9	64.9	32.4	26.0	70 LBS
430B	30	102,369	5.80	311	144	125	83.2	72.1	36.0	28.8	75 LBS
436B	36	122,843	5.80	373	173	150	100	86.5	43.3	34.6	75 LBS
439B	39	133,068	5.80	405	188	163	108	93.7	48.8*	39.1*	80 LBS
545B	45	153,554	5.80	467	216	188	125	108	54.1	43.3	90 LBS
554B	54	184,264	5.80	560	260	225	150	130	64.9	51.9	90 LBS
SPECIFY MODEL NUMBER, VOLTAGE AND EITHER 1 OR 3 PHASE WHEN ORDERING											

***** Delta connection (unbalanced load) amperage of high leg indicated.

1.3 WATER TEMPERATURE RECOVERY

Booster Heater water recovery formulas:

$$\text{G.P.H. (U.S.)} = \frac{415 \times kW}{\text{Temp. Rise (ºF)}} \qquad \text{L.P.H.} = \frac{874 \times kW}{\text{Temp. Rise (ºC)}}$$

TABLE 2. Water Temperature Recovery in GPH (LPH)

Model	kW	30°F (17°C)	40°F (22°C)	50°F (28°C)	60°F (33°C)	70°F (39°C)	80°F (44°C)	90°F (50°C)
304B	4	55 (208)	41 (155)	33 (125)	28 (106)	24 (91)	21 (79)	18 (68)
305B	5	69 (261)	52 (197)	41 (155)	34 (129)	29 (110)	26 (98)	23 (87)
306B	6	83 (314)	62 (235)	50 (189)	41 (155)	35 (132)	31 (117)	27 (102)
307B	7	97 (367)	72 (272)	58 (219)	48 (181)	41 (155)	36 (136)	32 (121)
309B	9	124 (469)	93 (352)	75 (284)	62 (235)	53 (200)	47 (178)	41 (155)
312B	12	166 (628)	124 (469)	100 (379)	83 (314)	71 (269)	62 (235)	55 (208)
313B	13	180 (681)	135 (511)	108 (409)	90 (341)	77 (291)	67 (254)	60 (227)
315B	15	208 (787)	156 (590)	125 (473)	104 (394)	89 (337)	78 (295)	69 (261)
318B	18	249 (942)	187 (708)	149 (564)	125 (473)	107 (405)	93 (352)	83 (314)
424B	24	332 (1256)	249 (942)	199 (753)	166 (628)	142 (537)	125 (473)	111 (420)
427B	27	374 (1415)	280 (1060)	224 (848)	187 (708)	160 (606)	140 (530)	125 (473)
430B	30	415 (1571)	311 (1177)	249 (942)	207 (783)	178 (673)	156 (590)	138 (522)
436B	36	498 (1885)	373 (1412)	299 (1132)	249 (942)	213 (806)	187 (708)	166 (628)
439B	39	539 (2040)	405 (1533)	324 (1226)	270 (1022)	231 (874)	202 (765)	180 (681)
545B	45	622 (2354)	467 (1767)	373 (1412)	311 (1177)	267 (1010)	233 (882)	207 (783)
554B	54	747 (2827)	560 (2120)	448 (1695)	373 (1412)	320 (1211)	280 (1060)	249 (942)

Installation Instructions Section 2

2.1 RECEIVING

INSPECT SHIPMENT FOR POSSIBLE DAMAGE. All goods are carefully manufactured, inspected, checked and packed by experienced workers. The manufacturer's responsibility ceases upon delivery of goods to the carrier in good condition. Any claims for damage, shortage in shipment or non-delivery must be filed immediately against the carrier by the consignee.

2.2 INTRODUCTION

With a great reputation of quality and reliability, *Super Hot* booster heaters can produce 180ºF rinse water making dishware cleaner, odorless and safer. Compared with other methods of sanitizing, the *Super Hot* Electric Booster is the economical choice, having high efficiency and using less detergent and rinse additives. *Super Hot* booster heaters provide the best sanitation method for your dishware dishwashing.

2.3 CAUTION

1. Disconnect all power supplies to prevent electrical shock and damage to equipment.
2. Installer must be a qualified, experienced service technician.
3. Conduct a thorough checkout when installation is complete.

2.4 BOOSTER HEATER LOCATION

The space saving compact booster heaters can be installed almost anywhere. The booster heater may be installed in an enclosed space and attached directly to a combustible surface, however, allow ample space for connecting, disconnecting and servicing the unit. Locate booster heater as close to dishwasher as possible. Dimensions are shown in Figure 1.

Sturdy plated steel legs are standard, but stainless steel hanging brackets for under counter suspension are also available (specify when ordering), see Figure 2.

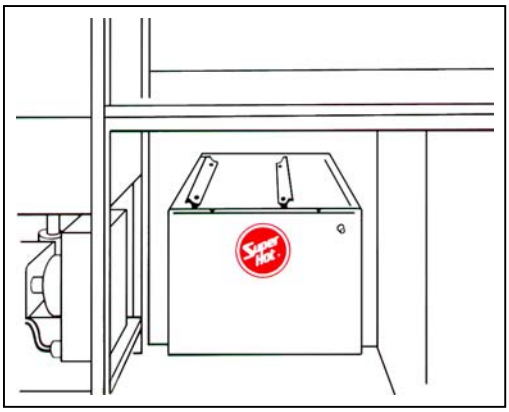

Figure 2 – Optional Hanging Brackets

2.5 PIPING

The recommended piping arrangement is shown in Figure 1.
Use copper tubing only. Install the pressure reducing valve (preset for 20 psi). Install the temperature and pressure relief valve on the booster heater and plumb discharge in accordance with local codes. The temperature and pressure gauge attaches to a tee on the inlet between reducing valve and booster heater. It is mandatory that a diatrol expansion chamber and shock absorber be installed in the line between booster heater and dishwasher (as close to dishwasher as possible). In addition, it is recommended that the inlet and outlet lines be insulated to prevent heat loss and that unions be used for piping connections to ease service.

All *Super Hot* booster heaters have 3/4" NPT inlet and outlet pipe size. Dielectric couplings should be used in connecting dissimilar metals, such as galvanized to copper, to prevent electrolysis. A check valve should not be installed in the supply line to the booster heater. All shut-off valves must be gate or ball valves, not globe valves.

2.6 FUNCTION OF PIPING ACCESSORIES

Expansion Chamber:
Quick closing solenoid valves on the dishwasher will produce a shock pressure exceedingly high – up to 800 lbs. This may cause leaks in the plumbing and damage equipment such as relief valves, gauges, tank, and etc. To extend the life of the booster heater and other equipment, we recommend that a Diatrol be installed on all installations.

Installation Instructions Section 2

Temperature and Pressure Indicating Gauge:
This gauge indicates the temperature and pressure and is useful when determining incoming water temperature or adjusting the pressure reducing valve. It should be installed between the pressure reducing valve and booster heater.
When a dishwasher is not equipped with a temperature gauge, a second gauge should be installed as close to dishwasher as possible to verify 180ºF rinse temperature.

Temperature and Pressure Relief Valve:
The relief valve protects the tank from becoming overheated and/or over-pressurized. It opens and releases water if the temperature exceeds 210ºF or if the pressure exceeds 125 psi (satisfies most local codes). This device must be installed directly on the booster heater.

Pressure Reducing Valve with By-Pass:
When the supply pressure exceeds the final rinse pressure requirements, a pressure reducing valve with built-in by-pass should be installed in the supply line to the booster heater. A pressure reducing valve without a by-pass should not be installed, as water expansion due to heating will cause the relief valve to open.

Optional Extra Low Water Cut-Off:
A number of service calls are caused by energizing the heating elements in a “dry” tank. Even momentary testing of the installation when the tank is dry will appreciably shorten the life of the element or burn it out and affect the calibration of the aquastat.
The low water cut-off will protect from burnout of heating elements by checking that the tank is completely filled with water before allowing the elements to operate.

Wiring and controls Instructions Section 3

3.1 WIRING

CAUTION:

AC ONLY, USE COPPER WIRE ONLY, DO NOT USE ALUMINUM.

All electrical wiring is to be done in accordance with the Canadian Electrical Code, CSA C22.2 part 1, and/or any local regulations and codes in Canada, or the National Electrical Code, ANSI/NFPA 70 (latest edition) and/or any local regulations and codes in U.S.A. Verify the nameplate rating and check the related codes to properly size conductors, switches and over-current protection. Check the voltage at the feeder panel, compare to the values shown in Table 1, and supply the correct voltage power to the power supply block on the booster heater. For wire connections, refer to the wiring diagram sticker on the back of the booster heater front cover.

3.2 CONTROLS

A custom designed “rapid response” aquastat provides temperature control ensures safe operation. The aquastat switch incorporates a magnetic contactor to complete the power circuit to the heating elements and control the water temperature. By use of an adjustable dial the operating aquastat can control the water to the desired temperature.

The electrical controls come pre-wired on the right-hand side of each booster heater where it is protected from high ambient temperatures.

An indicator light visible on the front panel indicates that there is power to the heating elements when the booster heater is in operation.

The low water cut-off (optional) uses a resistance-sensing probe to determine if the booster heater is filled with water. If the booster heater is filled with water, the relay coil will close and allow the element to turn on. Sensing resistance is dial-adjustable, turn dial clockwise to increase sensitivity.

Start-up Instructions Section 4

4.1 START-UP

WARNING:

The following instructions are intended as a guide for qualified persons. Before switching power on, fill system with water and vent air. Check for and repair any leaks in water piping.

Perform the following procedure to check for proper booster heater operation:

1. Set operating aquastat to give desired water temperature for dishwasher (usually 180ºF).
2. The operating aquastat setting should be at least 20ºF less than the temperature relief setting (210ºF).
3. Lift relief valve handle to ensure the booster heater is completely filled with water.
4. Check flow pressure with water flowing through the booster heater and, if necessary, readjust the pressure reducing valve to 20 psi or to pressure recommended by dishwasher manufacturer.
5. The pilot lamp indicates that power is on when booster heater is operating.

Maintenance Instructions Section 5

5.1 IMPORTANT

Many times when a booster heater does not appear to be functioning properly, the fault lies not with the booster heater itself but with factors outside of the heater. Therefore, before becoming involved in corrective work on the booster heater, the following steps should be followed:

Check the temperature of the water feeding into the booster heater tank. It must be 140ºF or the temperature designed and must be in sufficient quantity to hold its temperature throughout the dishwashing operation.

Incoming water temperature to the booster heater should not exceed 170ºF.

If incoming water exceeds 20 psi, a pressure reducing valve must be installed.

If the wash tank of the dishwasher is filled through the booster heater, this will use up all the 180ºF water in storage. Sufficient time must be allowed to reheat the water in storage before starting the dishwasher.

Water pressure at the inlet to the booster heater must be adequate for proper operation of the rinse cycle of the dishwasher.

Be sure that the relief valve is one supplied by Allied Engineering Company.

A check valve should not be installed ahead of the booster heater. Remove if present.

Booster Heater Size for Dishwasher Installations Section 6

6.1 BOOSTER HEATER SIZING CHART

All sizing are based on dishwasher manufacturer ratings. Confirm the booster size with dishwasher manufacturer before ordering it. Allied Engineering Company is not responsible for incorrect sizing of applications.

TABLE 3. *Super Hot* Booster Heater Sizing for Dishwashers

DISHWASHERS	BOOSTER HEATER SIZING CHART	40°F RISE	70°F RISE
ADAMATION	CSL-1390, CA-2, CA-3, CA-4	439B	(2) 436B
	CA, CA-1	554B	(2) 545B
BLAKESLEE	UC-21	306B	312B
	D-8	309B	313B
	Series "R" & "F"-CC, -EE, -LL, -MM, -LLL, -MMM, -PCC, -PEE, -PLL, -PMM (Multi-tank) with suffix "LC"	313B	424B
	Series XF-LL, XF-PLL, XF-MM, XF-PMM, XF-EEE, XF-LLL, XF-MMM (Multi-tank) with suffix "LC"	317B	430B
	DD-8	318B	430B
	Series R-L, R-PL, R-M, R-PM, F-L, F-PL, F-M, F-PM (single-tank)	436B	554B
	Series XF-L, XF-PL, XF-M, XF-PM (single tank)	(2) 436B	---
	Series XF-PEE, XF-PLL, XF-PMM, XF-EEE, XF-LLL, XF-MMM (Multi-tank)	545B	(2) 430B
	FA (Flight-A-Round) and RA (Rack-A-Round) use comparable "F" listing.		
CHAMPION	UH1	306B	309B
	DH1, DH1C	309B	318B
	44WS, 66WS	315B	427B
	PP28	427B	545B
	40KB, 44KB, 54KB, 60KB, 64KB	436B	554B
	UC-C	545B	(2) 436B
	UC-CW (6 ft center max)	554B	(2) 439B
CHEMICAL METHODS ASSOC.	CMA-44H with tank heater	424B	545B
HOBART	LX-30	304B	307B
	LX-18C, XL-30C, LX-40C, UM-4D, UMP-4D, WM-1D, WMP-1D, WM-5	304B	307B
	LX-18	305B	309B
	WM-5C	306B	309B
	SM-6T2	306B	312B
	WM-5	307B	312B
	AM-14T, AM-14F, AM-14TC	309B	313B
	UM-4, UMP-4, WM-1, WMP-1	309B	315B
	AM-12, AM-12C, AM-14, AM-14C	309B	312B
	C-44AW, CRS-66AW, CPW-80AW	312B	424B
	C-64W, CRS-86W, CPW-100W, C-88W, CRS-110W, CPW-124W	424B	436B
	FT800W	424B	439B
	C-64A, CRS-86A, CPW-100A, CMT-44	430B	554B
	C-44, CRS-66, CPW-80, C-44A, CRS-66A, CPW-80A, C-88A, CRS-110A, CPW-124A	436B	554B
	C-64, CRS-86, CPW-100	545B	(2) 436B
	FT-600, FT-700, C-54, CRS-76, CPW-90	554B	(2) 439B
	FT-300	554B	(2) 545B
	FT800	439B	554B
	FT800S, CRS-76A, CPW-90A, C-54A	439B	(2) 436B
	UTW-28, UTW-28C	318B	436B

Booster Heater Size for Dishwasher Instructions Section 6

DISHWASHERS	BOOSTER HEATER SIZING CHART	40°F RISE	70°F RISE
INSINGER	Commander 18-3, 18-4, 18-4h, Ensign 40-2	306B	312B
	Trac 321, Trac 321-2/RPW	318B	430B
	Admiral 44-4, 66-4	424B	436B
	Acmiral 44, 66-3	424B	439B
	Speeder 7, 64, 86-3, Century 14	424B	545B
	Master (all)	436B	554B
	Clipper (all)	424B	545B
	R106-2, Super 106-2	427B	545B
	Defender	436B	554B
JACKSON	JP-24, JP-24B, JP-24F, JP-24BF	304B	306B
	24B Series	---	304B
	10AB, 10APRB	---	305B
	44CE*, 66 CERPW	430B	554B
	54CE, 76 CERPW	436B	(2) 430B
	64CE, 86 CERPW	427B	439B
	100	312B	424B
	100B, 100PRB, 150B, 150PRB	---	309B
	150	312B	318B
	200	307B	312B
	200B	---	306B
	Tempstar, Tempstar SDS	306B	312B
	AJ-44, AJ-66, AJ-80	424B	545B
	AJ-54, AJ-76, AJ-90	436B	(2) 430B
	AJ-64, AJ-86, AJ-100	424B	439B
	*Model #44CE w/SN1999 or below requires larger booster than listed.		
KNIGHT EQUIPMENT (CANADA) LTD.	KLE-112-HL	307B	312B
METALWASH/ INTEDGE	FW4	312B	318B
STERO	SF-1RA, SC20-1	307B	312B
	SF-2RA, SF-2DRA, SD-2RA, SDRA, SDRA-PACK	312B	318B
	SCT-44, SCT-44-10, SCT-54, SCT-76S, SCT-76SC, SCT-76SM	436B	554B
	SCT-64, SCT-76, SCT-80, SCT-94, SCT-108, SCT-120, SCT-94S, SCT-108S, SCT-120S, SCT-94SC, SCT-108SC, SCT-120SC, SCT-94SM, SCT-120SM, SCT-150SM	545B	554B
	U-31-A	436B	554B
	U-31-A2, STPCW-5, STPCW-19, STPCW-19PS, STPCW-20, STPCW-22, STPCW-24	545B	(2) 436B
	STPCW-12PS, STPC-15S	554B	(2) 554B
	STPC-12PS, STPC-15S	554B	(2) 439B
	STPC-15, STPC-19, STPC-19S, STPC-20, STPC-22, STPC-24	436B	(2) 430B
	STBUW-14	554B	(2) 554B
	SC-2-4, SC-6-4, SC-1-2-3, SC-1-6-4, SC-5-6-4, SC-5-2-4	436B	545B
	SC-2-3-4, SC-6-3-4, SC-2-7-4, SC-1-2-7-4, SC-1-6-3-4, SC-5-2-3-4, SC-1-6-7-4, SC-5-6-3-4, SC-5-2-7-4	430B	(2) 427B
	SC20-2	312B	424B
	SC-2-8, SC-2-9, SC-1-2-8, SC-5-6-8, SC-6-8, SC-6-9, SC-1-6-8, SC-5-6-9, SC-5-2-9, SC-1-6-9, SC-5-2-8	318B	436B
VULCAN-HART	R16BTF, CU16BTF	309B	318B
	3D20TF, CD20TF	312B	424B
	A-64 Series, A-81 Series	430B	554B
	A44 Series, A54 Series, CP-2, CP-3, HP-3	545B	(2) 439B

General Information Section 7

7.1 REPLACEMENT PARTS

NO.	DESCRIPTION
1	FRONT PANEL
2	INDICATOR LIGHT
3	OPERATING AQUASTAT
4	HIGH LIMIT AQUASTAT
5	LOW LEVEL CUT–OFF PROBE (OPTIONAL)
6	FLANGE TYPE ELEMENT
7	FLANGE TYPE ELEMENT GASKET
8	TANK
9	LEGS
10	HANGING SUPPORT BRACKETS (OPTIONAL)
11	CASING
12	REAR PANEL
13	GROUND LUG
14	CONTACTOR
15	TRANSFORMER
16	RIGHT CASING PANEL
17	FUSE HOLDER (SOME MODELS)
18	FUSE (SOME MODELS)
19	LOW WATER CUT–OFF CONTROLLER (OPTIONAL)
20	POWER TERMINAL BLOCK

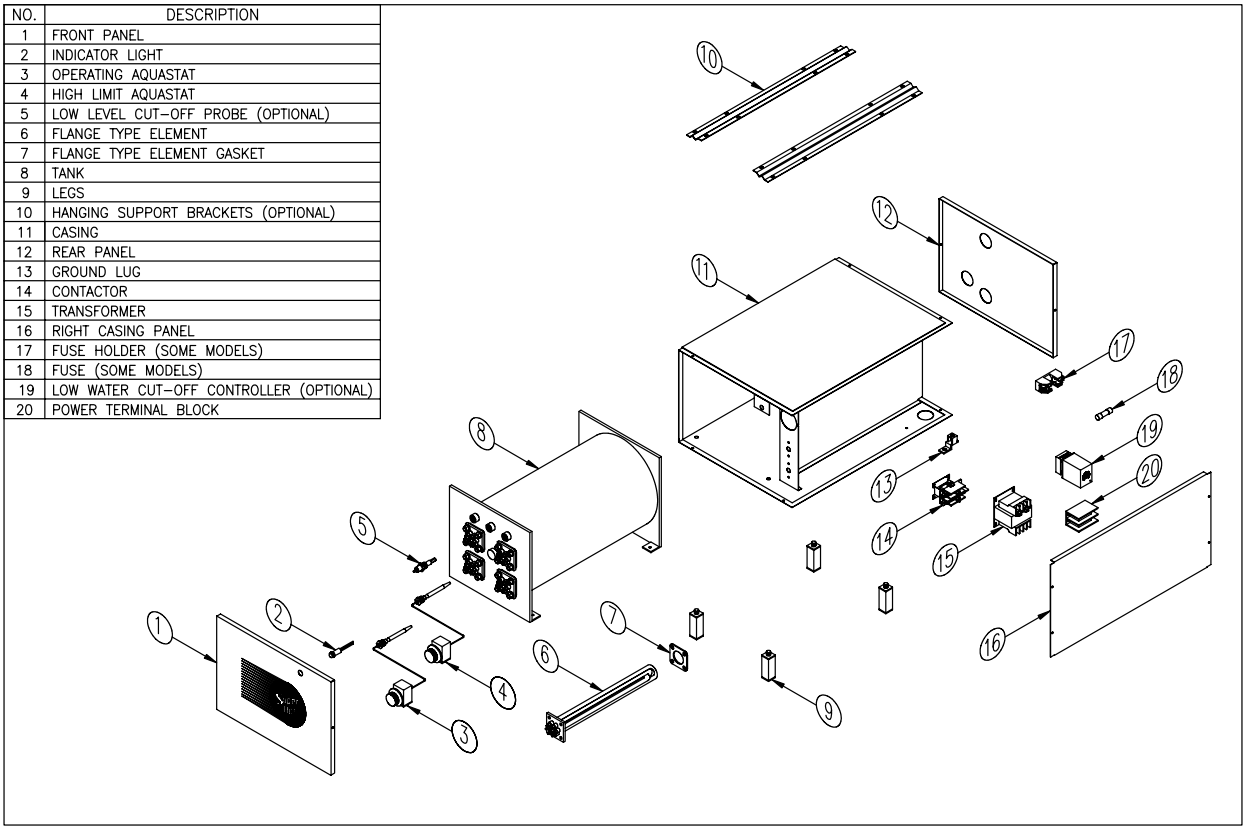

Figure 3 – Replacement Parts

7.2 ORDERING

A replacement or replacement parts may be purchased through any Allied Engineering Company distributor – call us to help locate a distributor near your area. If you require any technical assistance or have any comments about our product, please write or phone us.

Service Department
Allied Engineering Company
94 Riverside Drive
North Vancouver, B.C. V7H 2M6
Telephone: (604) 929-1214
Fax: (604) 929-5184

Trouble Shooting Section 8

8.1 TROUBLE SHOOTING

Problem	Possible Cause	Solution
Temperature too low or too high. (Read rinse thermometer on dishwasher).	Incorrect thermostat setting.	Remove booster heater front panel. Adjust thermostat to correct setting and check thermometer during rinse cycle. If machine cold, run rinse cycle twice before checking proper reading. Temperature should reach 180ºF – 185ºF (82ºC –85ºC).
	Thermostat fault.	Check and replace, if necessary.
Rinse water temperature still too low during continuous use.	Water supply to booster heater below 140ºF (60ºC).	Read incoming water temperature by combination gauge. Incoming temperature should be 140ºF (60ºC) (unless booster heater is specifically designed for lower supply temperature). Increase incoming water temperature to 140ºF (60ºC) at hot water supply tank.
	Pressure setting of pressure reducing valve too high.	Read pressure on combination gauge during rinse cycle. Pressure reducing valve "PRV" should be adjusted to dishwasher specifications usually between 20 – 25 p.s.i.
	Thermometer on dishwasher not functioning properly.	Tap thermometer gauge with finger during rinse cycle. If needle does not move freely, contact dishwasher manufacturer.
	Booster heater too far from dishwasher (more than 3 ft.)	Insulate pipe from booster heater to dishwasher. Relocate booster heater closer to dishwasher.
	Heating element(s) burned out, faulty contactor or loose wires	Turn off electricity to the booster heater. Check elements, contactor and wiring for continuity.

Trouble Shooting — Section 8

Problem	Possible Cause	Solution
Pressure temperature relief valve discharges water	Thermostat set too high above 185ºF (85ºC)	Remove front cover. Adjust thermostat to a lower setting.
	Pressure increases to 125 p.s.i. during booster heater heating cycle because:	
	A. Pressure reducing valve is an incorrect style (without relief by-pass). Letter "B" should be in model number.	Replace with correct pressure reducing valve.
	B. By-pass in pressure reducing valve plugged or inoperative.	While unit in heating cycle, tap pressure-reducing valve with wood hammer or screwdriver handle. If pressure gauge does not show drop in pressure, replace pressure-reducing valve.
Pressure temperature relief valve discharges water (after checking above).	Relief valve not reseating properly.	Quickly lift and release manual discharge lever on relief valve to assist proper reseating. If this fails, replace temperature and pressure relief valve.
Water leaking from booster heater.	Element and thermostat threads may be leaking.	Turn off electricity to booster heater and tighten elements. Turn off water, drain, remove and apply sealant if necessary. (Be sure to turn off electricity before draining or elements will burn out).
	Plumbing connections may be leaking.	Tighten incoming pipes, heating elements, and temperature and pressure relief valve. Turn off water, drain and remove and apply sealant if necessary. (Be sure to turn off electricity before draining or elements will burn out).

Notes Section 9

Index Section 10

10.0 INDEX