

KEYSTOKER BOILER INSTALLATION INSTRUCTIONS

Through these instructions, we will try to guide you on a step by step procedure for installing, adjusting and operating of your new KEYSTOKER stoker boiler unit.

Selection of location. Keystoker boilers are available with fire door on the right or left side. When you stand at the stoker end of boiler and look directly over top of boiler toward stack end, you may choose to have fire door on the right or left side of boiler. Selecting a position to make this door accessible is important. When door side must be placed toward a wall, 30" clearance is recommended for easy access to fire door and for ash removal. Clearance from wall at stack end should be 18" to allow removal of water heating coil if necessary.

Setting Up Boiler. Place boiler in desired position. We strongly recommend placing steel shims or bricks under each corner of boiler to allow an air space, to prevent moisture from accumulating and rusting base of boiler. Using a level, plumb stoker end of boiler, adding steel shims as necessary to plumb the stoker end of the boiler. Failure to do this will change pitch on stoker unit and may have adverse effects when burning coal. Again with level, check top of boiler from side to side, adding shims as necessary to level boiler. Do not place shims completely under boiler. Allow 1" to 2" of shims to extend out from under the boiler. Shims will then be used as a base to rest insulated jacket upon.

Hot water piping system. The top of boiler has at least 4 openings. The largest opening is feed line to your radiation. Since this outlet has a drop tube welded inside the boiler, you must use it for your radiation supply line. Even though it may be necessary to bush down to a smaller size, we recommend starting with 1 1/4" pipe and installing an 1-1/4" x 1-1/4" x 1" tee in supply line to be used for a by-pass loop. (See Installation Diagram) You may now make your piping connections from feed outlet on boiler to flow valve.

You may use either of large openings on bottom of stack end of boiler as your return. Select side that will allow convenient access to circulator for future servicing. Install return piping and circulator, again referring to (Installation Diagram) for location of by-pass loop. Your 1-1/4" x 1-1/4" x 1" tee must be installed below circulator.

Install by-pass loop as per (Installation Diagram) with 1" pipe size. Place a tee 1' x 1/2" F x 1" in by-pass loop to allow installation of immersion well for the 4006B Honeywell Hi Limit Control to extend into full water flow.

Over 50 years of installation experience has proven to us that the above mentioned by-pass loop is absolutely necessary for optimum performance of you heating system.

Install a boiler drain valve in the other large opening at bottom of boiler. (See Diagram)

Boiler feed and domestic water piping. Refer to (Installation Diagram) Install 1/2" male adapters in both fittings on domestic water coil. Install a 1/2" male adapter in either of the 1/2" fittings on top of boiler to be used for a boiler water feed. Plug all other fittings on stack end of boiler using teflon tape or pipe joint compound.

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NOTE: Before proceeding with connections for piping of boiler feed and domestic water, INSTALL stack end of insulated steel jacket **NOW**. Then you may proceed with completion of domestic piping and installation of necessary valves. (See Diagram)

If a domestic water tempering valve or an automatic fill valve is desired, install as per manufacturers instructions.

Installation and piping of accessories. A $\frac{3}{4}$ " 30 Lb. Relief valve must be installed in $\frac{3}{4}$ " fitting on top of boiler, turning discharge to the side. Install a pipe into relief valve so that it extends past the side of boiler. Solder an elbow and a nipple on pipe, point toward floor in an area that is safe and free from normal household traffic.

Install altitude guage. (Temperature/Pressure guage)

Connect expansion tank directly to remaining fitting on top of boiler, NOT to any other part of heating system. Install a stop and waste valve in pipe going to expansion tank with direction marker on valve pointing toward expansion tank. (See Diagram)

Install immersion well for triple aquastat relay in $\frac{3}{4}$ " fitting on side of boiler above fire door. (See Diagram)

Place fire door into boiler opening and secure by tightening screws in frame of fire door.

Jacket and stoker installation. Install hopper end of jacket, then blank side, then fire door side. Secure with #8 x 1 sheet metal screws provided. Install jacket top, and secure with #8 x $\frac{3}{8}$ sheet metal screws.

Stoker units are shipped entirely assembled. Lift stoker into opening, bottom of stoker unit has a $\frac{1}{4}$ " rod welded in place which must go inside stoker opening. Place a thick smear of furnace cement on flange of stoker and tilt into place, securing with $\frac{3}{8}$ " x $1\frac{1}{4}$ " machine screws, washers and nuts as provided.

Set hopper into place. Bottom of hopper should lap over stoker throat approximately 1". Since one hopper is used for several size stokers, it may be necessary to trim the opening. Bend flange down to fit inside throat of stoker. Be sure mechanism is free to operate.

Control installation and electrical wiring. Install triple aquastat into its well, being careful not to kink thin capillary tube. Screw timer to jacket next to triple aquastat.

Install 4006B Hi Limit into well in by-pass loop. (See Diagram)

Your stoker boiler should be on its own circuit. From main breaker to boiler, use 12-2 wire with ground on a 20 Amp fuse. Follow wiring diagram and any applicable UL and local codes.

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Stack pipe and Draft Control installation. Stack pipe may now be connected from boiler to chimney, using as few elbows as possible. If stack pipe must be reduced in size, reduce stack at thimble. It is important to run full size stack from boiler to chimney thimble. Install barometric draft control in first full section of stack closest to boiler. Follow instructions packed with draft control, making sure draft control bearings are level, and face of draft control is perpendicular to floor.

Initial start up. Fill system by opening boiler feed valve. Open air vents on radiation one at a time until air is removed from system. Normal operating pressure on most heating systems is between 10 and 20 PSI. Automatic fill valves are factory set at 12 PSI. If an automatic fill valve is not used, then boiler feed valve must remain in normally closed position.

Open valve supplying water to domestic hot water coil, this valve must remain in the normally open position.

Open valve supplying water to expansion tank, this valve must remain in the normally open position.

Starting Coal Fire. Put coal in hopper. By reaching through fire door, pull coal down to cover entire grate. Crush several charcoal briquets into smaller pieces, crumble newspaper and dig it through the coal, so it touches grate. Lay charcoal on top of newspaper. Turn on switch. When charcoal turns red, place a few handfuls of coal on top of charcoal. If fire moves toward bottom of grate before fire is established, coal feed can be slowed down by turning red nut CCW or by flipping feed bolt to a sideward position. (Part #22 on Unit specification sheet)

After Starting Coal Fire. Allow stove and chimney to warm up. Insert draft gauge through pre-drilled hole in upper portion of fire door. Shut stoker unit off with switch. Adjust barometric damper until draft gauge reads (-.02). Turn stoker unit on. Open combustion air intake shutter (located on bottom of scroll between stoker motor and gear box.) until draft gauge reads (-.01 to -.02). Shut stoker unit off, recheck draft readings, then restart stoker.

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As prices of fuel continue to rise - KEYSTOKER - continues to improve and make its products more fuel efficient.

To obtain a more complete burn out of coal, a small secondary blower motor was attached to the stoker unit. THIS MOTOR IS DESIGNED FOR CONTINUOUS RUN.

When large stoker motor is running on demand, small blower will assist with combustion and heat output, by producing a more intense and hotter fire. When demand cycle is completed, large stoker motor will shut off, and small secondary motor will continue to run. This will cause the coal that is already on the grate to burn, rather than to allow coal to smolder and die out in an unburned condition. This will achieve a cleaner ash, and allow more heat to be produced and absorbed into heating system.

During summer operation, the small combustion motor will force a small amount of air through grates at all times, which will cause the ash to become like powder. It also prevents the fire from going out. At the same time, it reduces the size of fire bed to approximately 1½" to 2" which will prevent boiler water from becoming overheated.

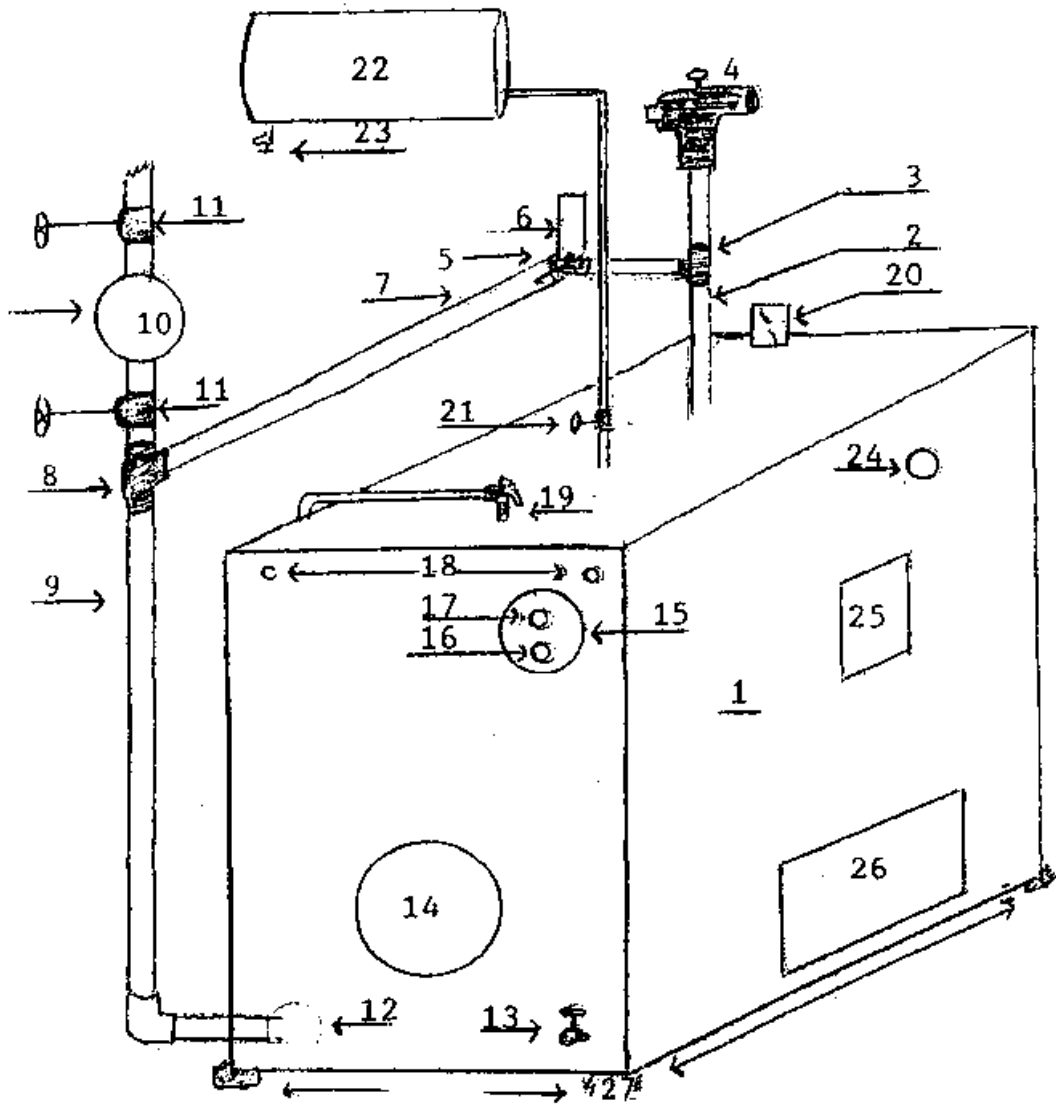
The small secondary combustion motor has an adjustable air shutter, that will need to be set with a draft guage. (Normal Settings are -.01 to -.02)

Proper sizing of fire is obtained by turning red nut on feed control arm. (CW for more coal feed - CCW for less coal feed)

Location and final placement for red nut will be determined by size of coal you purchase. For rice coal, red nut might be turned down 14 or 15 turns from maximum setting, whereas for buck-wheat coal, red nut might only be turned down 5 or 6 turns from maximum setting.

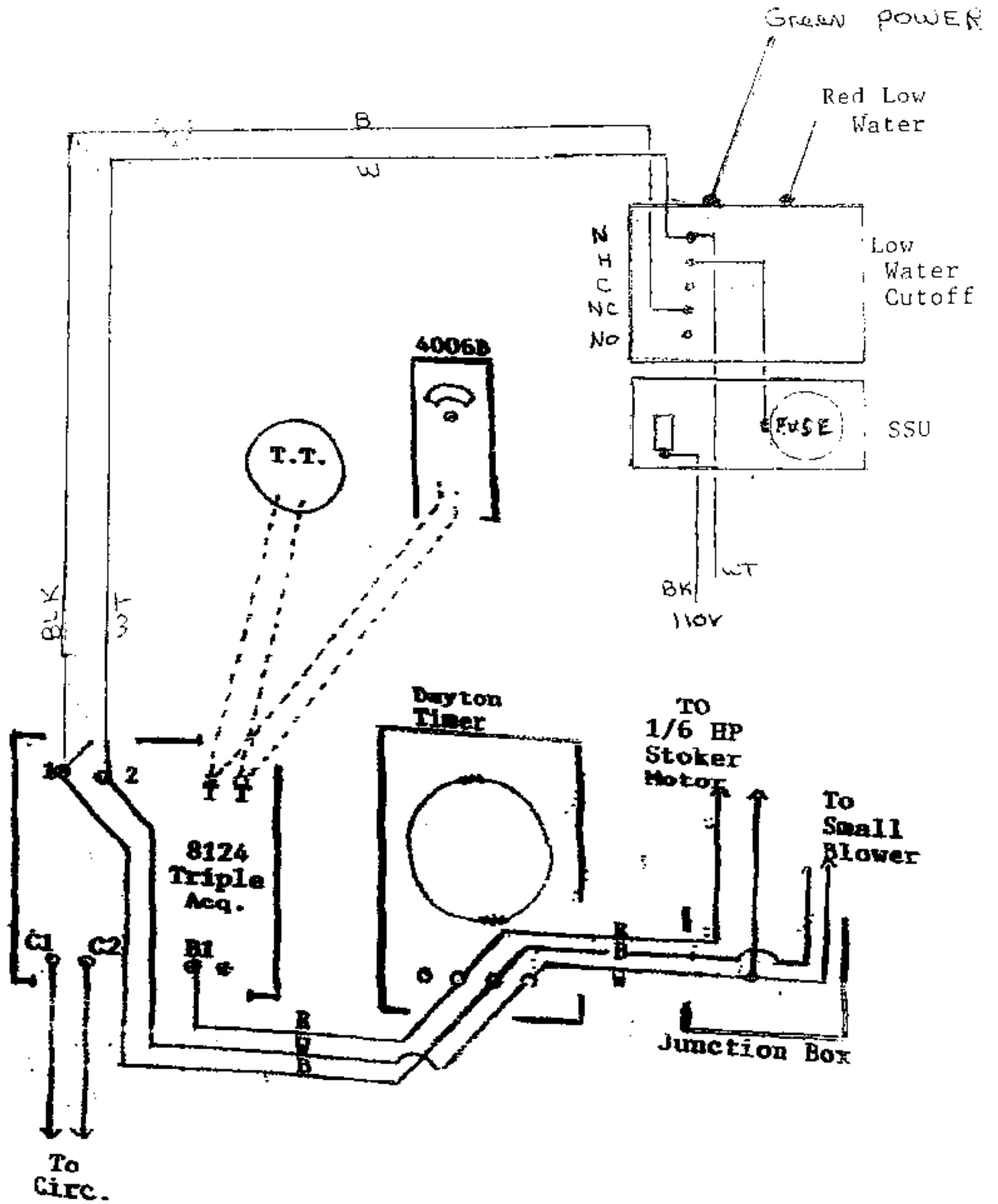
During winter operation, hot coals should never be pushed off end of grate. This indicates coal feed needs to be reduced (CCW). Or, if during winter operation, fire bed is too small, turn red nut (CW).

After coal feed adjustment is completed, if during summer, the water is too hot... DO NOT ADJUST COAL FEED. Reduce timer only. If fire goes out... DO NOT ADJUST COAL FEED. Increase timer only.

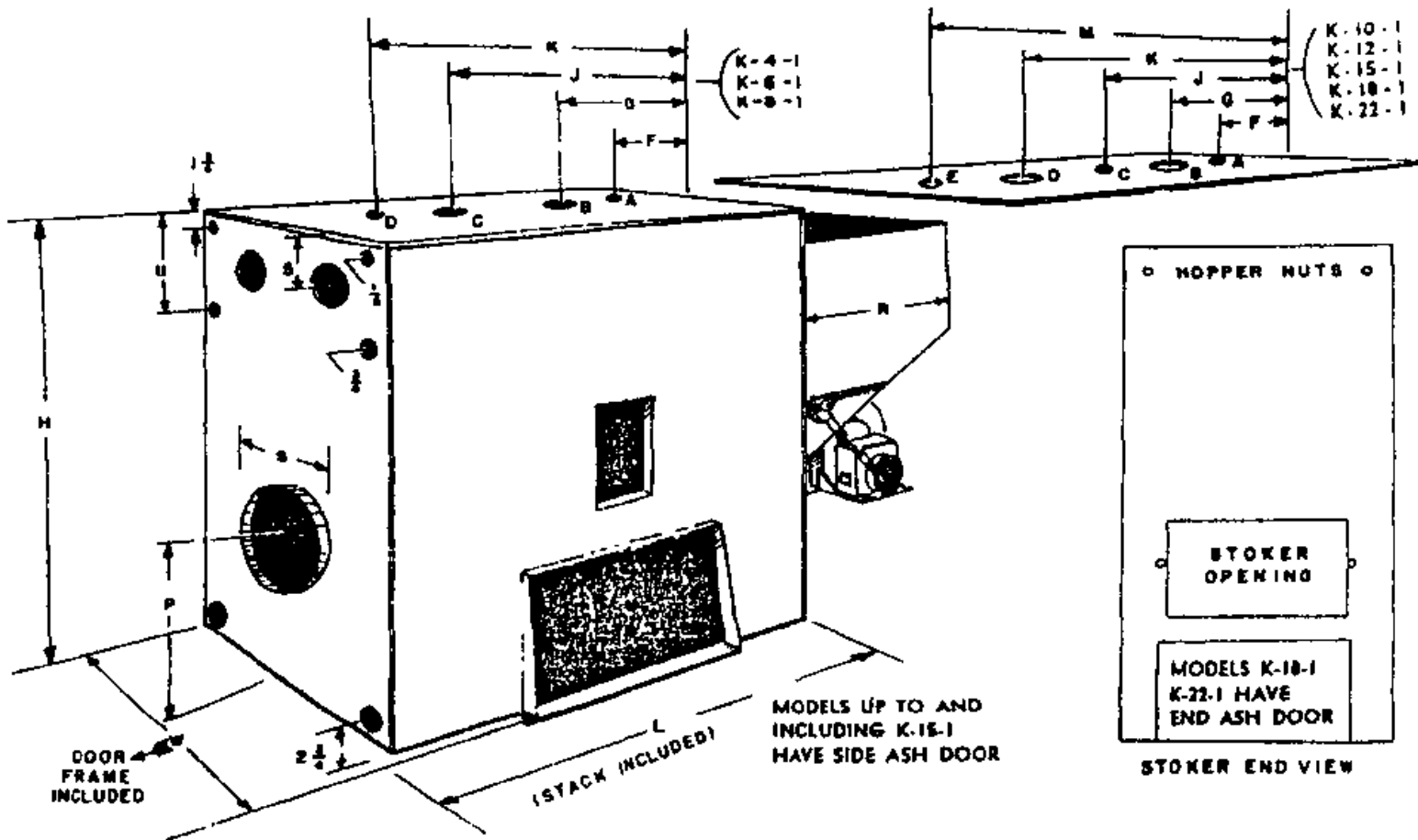


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|--------------------------------|-------------------------------|
| 1. Boiler | 15. Domestic Hot Water Coil |
| 2. 1½" Supply Line | 16. Cold water to coil |
| 3. 1½ x 1½ x 1 Tee | 17. Hot water from coil |
| 4. Flow Valve | 18. Optional boiler feed port |
| 5. 1 x ½F x 1 Tee | 19. Relief valve |
| 6. 4006B Safety Control | 20. Altitude Gauge |
| 7. By-Pass loop | 21. Valve to Expansion Tank |
| 8. 1½ x 1½ x 1 Tee | 22. Expansion Tank |
| 9. 1½" Return Line | 23. Tank Drain Valve |
| 10. Circulator | 24. Triple Acquastat Port |
| 11. Valves above & below Circ. | 25. Fire Door |
| 12. Return Line Port | 26. Ash Door |
| 13. Boiler Drain valve | 27. Boiler Shims |
| 14. Stack Outlet | |

Coal



DIMENSIONS



MODEL	A	B	C	D	E	F	G	J	K	M	P	R	W	L	H	S	LOW WATER LEVEL
KA-4-1	1/2	1 1/2	1/2	3/4	—	5 1/2	12	18 3/4	22 3/4	—	15 1/2	21 1/8	22	34	47	8	42
KA-6-1	1	1 1/2	1/2	3/4	—	6	14	21	25	—	16 1/2	21 1/8	23	38 1/2	52	8	47
KB-8-1	1	3	1/2	3/4	—	5	11 1/2	17	23	—	16 1/2	22 1/4	28	40 1/2	54 1/2	9	48 7/8
KC-10-1	3/4	3	1	3	3/4	4	10	19 1/2	29	35	16 1/2	23 1/2	30	42 1/2	55 1/2	10	49 7/8
KD-12-1	3/4	3	1	3	3/4	6	13	22 1/2	32	39	16 1/4	23 1/2	30	48 1/2	54 1/2	10	48 7/8
KE-15-1	3/4	4	1	4	3/4	6	15	26	37	46	17 1/4	23 1/2	32	53 1/2	56 1/2	12	50 7/8
KF-18-1	3/4	4	1	4	3/4	7 1/2	15 1/2	25 1/2	35 1/2	43 1/2	17	24	32	53	60 1/2	12	54 7/8
KG-22-1	3/4	4	1	4	3/4	8	16	26	35	53	13 1/4	26 3/8	36	61	60 1/2	14	54 7/8

THESE MEASUREMENTS TAKEN FROM UNJACKETED BOILER.



SPECIFICATIONS

**a RIGHT size
for every need
K-1 SERIES**

Model No	TOTAL CAPACITY SQ. FT		RECOMMENDED LOAD FEET OF RADIATION		BTU PER HR TO NEAREST THOUSAND		WEIGHT IN POUNDS		CAPACITY	
	STEAM	HOT WATER	STEAM	HOT WATER	NET	GROSS	BOILER	JACKET	GALLONS WATER	POUNDS COAL
									BOILER	HOPPER
KA-4-1	400	640	280	450	67	96	750	65	40	225
KA-6-1	600	960	420	675	101	144	925	75	55	275
KB-8-1	800	1280	560	900	134	192	1125	94	74	315
KC-10-1	1000	1600	700	1125	168	240	1200	98.5	86	450
KD-12-1	1200	1920	840	1350	202	288	1575	104.5	96	525
KE-15-1	1500	2400	1050	1687	252	360	1922	150	122	525
KF-18-1	1800	2880	1260	2025	302	432	2175	165	154	525
KG-22-1	2200	3520	1540	2475	371	528	2250	190	188	585

SQUARE FEET OF HEATING SURFACE EQUAL TO SIX TIMES MODEL NO

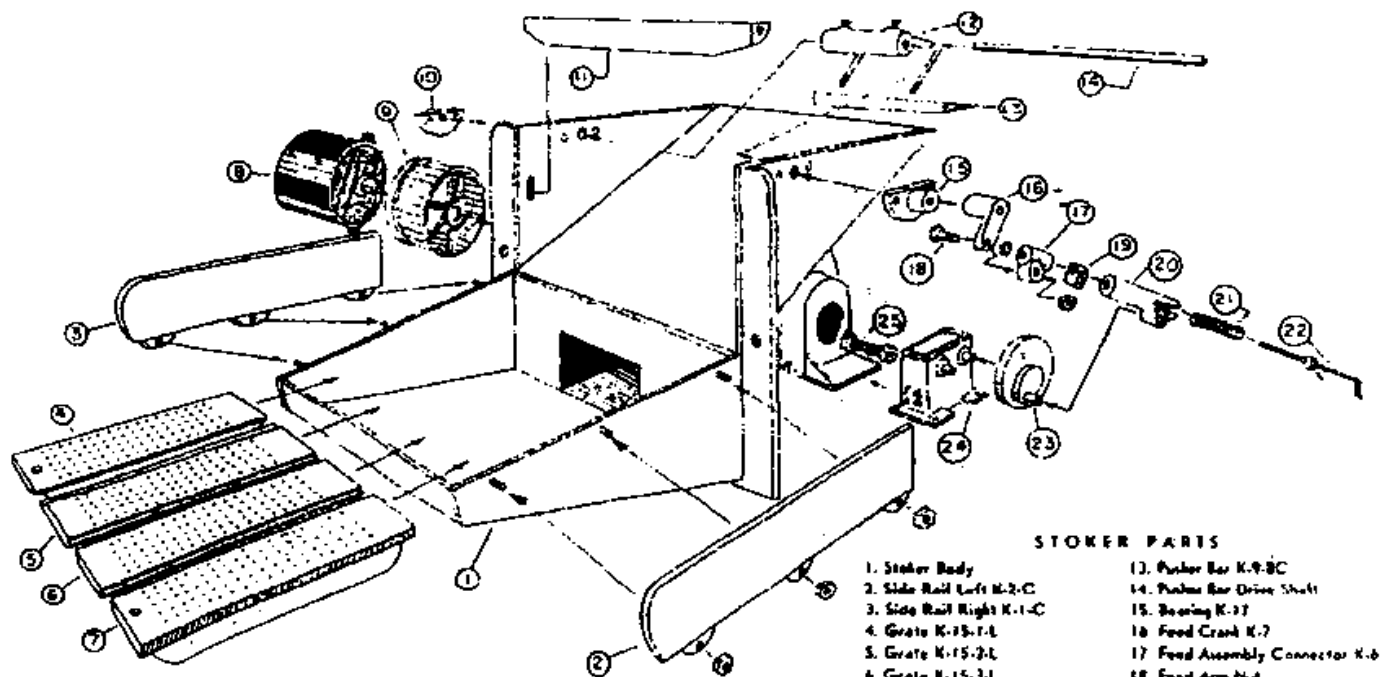
Tankless Water Heater Capacity - 200 G.P.H. (ALL MODELS)

Provision is made for an additional Heater in all Models EXCEPT KA-4-1

KEYSTOKER UNIT

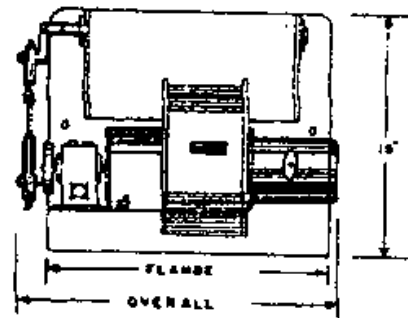
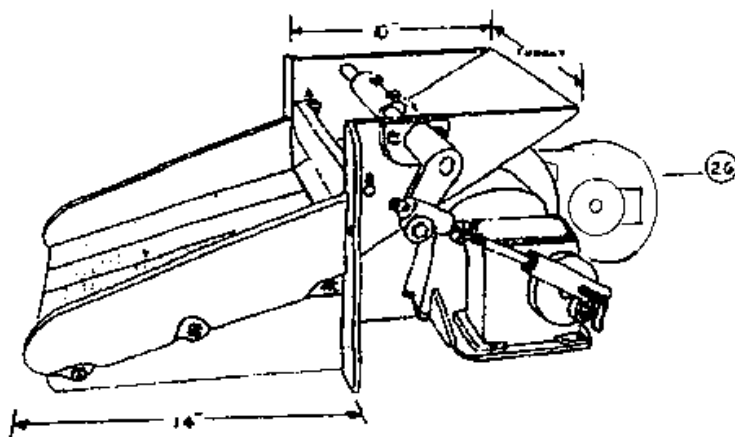
Ratings and Specifications

Stoker Size	No. of Grates	Couplings	14" Grate Width	Flange Width	Overall Width	Throat	Motor H. P.	Gross B. T. U. Thousand	Coal Lb./Hr.	Unit Wt. Lbs.
A	3	5"	9"	13"	20 $\frac{1}{2}$ "	9"	1/6	169	20	110
B	4	6"	12"	16"	21 $\frac{1}{2}$ "	12"	1/6	270	30	126
C	5	6"	15"	19"	21 $\frac{1}{2}$ "	15"	1/6	338	40	132
D	6	6"	18"	22"	26"	18"	1/6	405	48	148
E	7	7 $\frac{1}{2}$ "	21"	25"	27"	20 $\frac{1}{4}$ "	1/4	500	60	164
F	8	7 $\frac{1}{2}$ "	24"	28"	29"	23 $\frac{1}{4}$ "	1/4	585	70	180
G	9	7 $\frac{1}{2}$ "	27"	30 $\frac{1}{8}$ "	30 $\frac{1}{8}$ "	26 $\frac{1}{8}$ "	1/4	NT	85	196



STOKER PARTS

1. Stoker Body
2. Side Rail Left K-2-C
3. Side Rail Right K-1-C
4. Grate K-15-1-L
5. Grate K-15-2-L
6. Grate K-15-3-L
7. Grate K-15-4-L
8. Motor
9. Blower Rotor
10. Bearing K-19
11. Throat Strap K-18
12. Pusher Bar Drive Yoke K-8-BC
13. Pusher Bar K-9-BC
14. Pusher Bar Drive Shaft
15. Bearing K-17
16. Food Crank K-7
17. Feed Assembly Connector K-6
18. Feed Arm Nut
19. Feed Arm Adjusting Nut K-1
20. Feed Latch K-12
21. Feed Spring
22. Feed Belt
23. Drive Wheel K-5
24. Gear Box K-16
25. Coupling
26. 2 1/2 Comb. motor



Trouble Shooting Hints

Problem	Possible Cause	Remedy
Stoker doesn't run.	Main circuit breaker tripped. Main fuse blown. Fuse on stoker blown. Motor out on reset. Lo water level (steam).	Reset Replace Replace Press reset button on motor. Fill boiler to proper water level.
Stoker motor goes out on reset.	Obstruction in throat of stoker. Feed mechanism tight or corroded. Motor or gearbox defective.	Empty hopper and clear. Empty hopper and free-soaking with penetrating oil - Use dry coal to prevent reoccurrence. Replace Keystone Mfg. Company 60 Keystoker Lane Schuylkill Haven, Pa. 17972 Phone: 570-385-3873
Pressure fluctuates and water out relief valve	Expansion tank full of water Relief valve defective	<u>Drain</u> - Close valve in pipe that goes from expansion tank to boiler Drain tank dry. Close drain in expansion tank. Open valve in pipe to expansion tank. put water pressure in boiler up to 12 to 15 lbs.

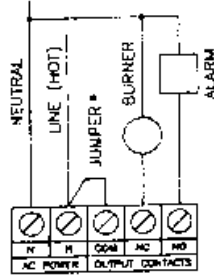
Problem	Possible cause	Remedy
Stoker runs but doesn't feed coal.	Feed nut backed off too far.	Increase feed - see preceding instructions.
	Obstruction in throat of stoker.	Empty hopper and remove obstruction.
	Feed mechanism tight or corroded.	Empty hopper - free - use dry coal to prevent reoccurrence.
	Broken or slipping coupling.	Replace
	Defective gearbox	Replace
	Feed mechanism out of adjustment.	Throat bar height to be 1 - 3/4" to 2" (Part #11). Pusher bar (Part #12) to be approximately 3/4" behind the face (flat part) of throat bar when in its most forward position with feed nut (Part #19).

Circulator doesn't run.	Lo limit setting in triple aquastat too high.	<u>Summer</u> Set Lo at 140	<u>Winter</u> 160
	Boiler not up to temperature.	Set Hi at 160	180
	Firebed too small.	Increase coal feed to get bigger fire.	
	Defective thermostat.	Replace	
	Circulator defective.	Replace	

Circulator runs but no heat.	Air in lines.	Purge air from radiation.	
	Pressure low.	Increase - 12 to 15 lbs. Check for leaks if pressure drops frequently.	

LWCO WIRING DIAGRAM USING
BURNER CIRCUIT POWER
SOURCE

FIG. 6

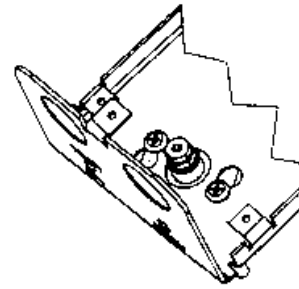


DWG. #1108-1

*Factory installed

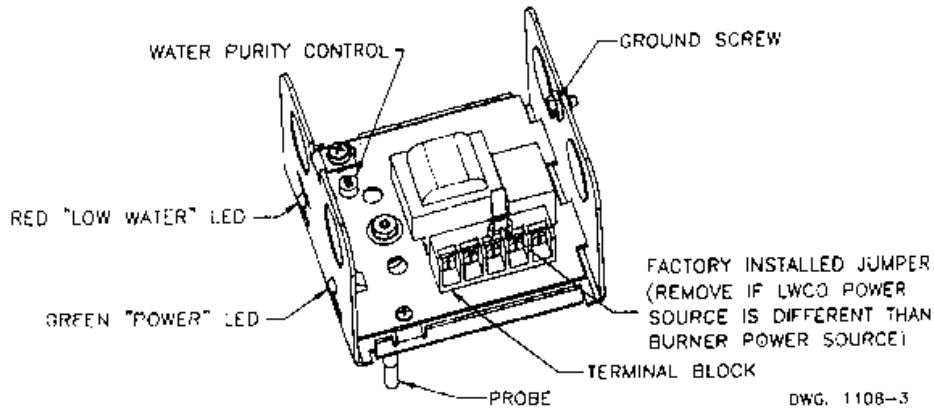
CONTROL UNIT MOUNTED ON PROBE

FIG. 2



DWG. #1108-2

LWCO
FIG.3



DWG. 1108-3

INSTALLATION

IMPORTANT NOTES FOR PROBE INSTALLATION:
Apply a small amount of pipe sealant to external threads of the probe.

CAUTION: DO NOT use teflon tape!

1. Be sure the probe is installed above the minimum safe water level, as previously determined from the boiler manufacturer's literature.
2. Be sure the probe extends into the boiler cavity so that contact with the water is made.
3. Be sure the exposed portion of the stainless steel probe is a minimum of 1/4" from any grounding surface inside the boiler to prevent the probe from shorting (see Fig. 1).

Control Unit Mounting onto Probe (See Fig. 2)

1. Tighten the probe into the tapped location of the boiler with a wrench, using the bushing flats provided.
2. Make sure the heads of the two mounting screws in the probe bushing are loosened approximately 1/8" from the bushing surface.
3. Then remove the first lock washer/nut from the probe threads.
4. Orient the slotted holes in the control unit over the heads of the mounting screws of the probe and turn control unit counter-clockwise so that the ends of the slots are fully under the mounting screw heads. Tighten mounting screws.
5. Replace the lock washer/nut onto probe and tighten.

