



PRECISION BOILERS

PCW COMPAC ELECTRIC HOT WATER BOILERS



DESIGN ADVANTAGES

Compact Benefits

Ideal for new boiler applications or to RETROFIT existing installations, because it fits through many existing doorways with ease.

- Available in ratings from 15 KW to 720 KW
- Requires less square footage floor space, and does not require horizontal clearance for element removal.
- Heavy duty/ 16 gauge cabinet and flanged steel base provides greater structural strength.
- All electrical components are UL listed or recognized.
- Optional features and trim available to meet any custom design criteria.
- Individual flanged U-tube design heating element shortens down time for element replacement.

Compact Engineering Features

- Meets CSD-1 requirements (units greater than 117KW)
- Small foot print saves in building construction cost.
- Close temperature control because control sensor is located in the outlet pipe.
- Individual immersion heating elements are 2 1/2" square flanged for ease of replacement. The elements are made of a highly corrosion resistant Incoloy sheath, and nickel-chromium resistance wire packed in magnesium oxide powder in a U-tube design.
- No horizontal removal clearance required.
- Vertical design of boiler allows for easier installation in existing or new piping systems.

STRINGENT STANDARDS

- ASME Section IV "H" Code
- UL Subject 834
- NEC/NFPA Article 424-G
- ASME Safety Code CSD-1 (>117 KW)

STANDARD FEATURES AND ACCESSORIES

- ASME National Board Registered Pressure Vessel (150 PSI / 250°F)
- Heavy Duty Steel Boiler Vessel Housing
- Four Inch Fiberglass Insulation
- Three Inch NPT Inlet and Outlet
- ASME Safety Relief Valve
- Pressure Gauge w/ Cock
- Drain Valve
- Incoloy-Sheathed Elements
- Construction per NEC & UL, with UL Label
- Electronic Digital Temperature Readout (except 1 and 2 step models)
- Integral Electric Control Panel with Key-Locked Door
- Internal Branch Circuit Fusing
- Magnetic Contactors rated 500,000 Cycles
- Main Supply Circuit Lugs
- 120 Volt Fused Control Transformer
- On/Off Switch w/ Pilot Light
- Manual Limit Toggle Switches (one per step)
- Status Pilot Light for each Stage/Step
- Probe-type Low Water Cut-Off
Note: Manual Reset, Test & Pilot Light Provided
Units > 117KW
- Two Adjustable High Limit Cutouts:
(1) Auto Reset (1) Manual Reset
Note: Manual Reset provided only on units > 2 stages
- Automatic Temperature Control via:
On-Off Temperature Switches (1 & 2 step units)
Electronic Multi Stage Control (3 & 4 step units)
Proportional Progressive Sequence Step Control (units > 4 steps)



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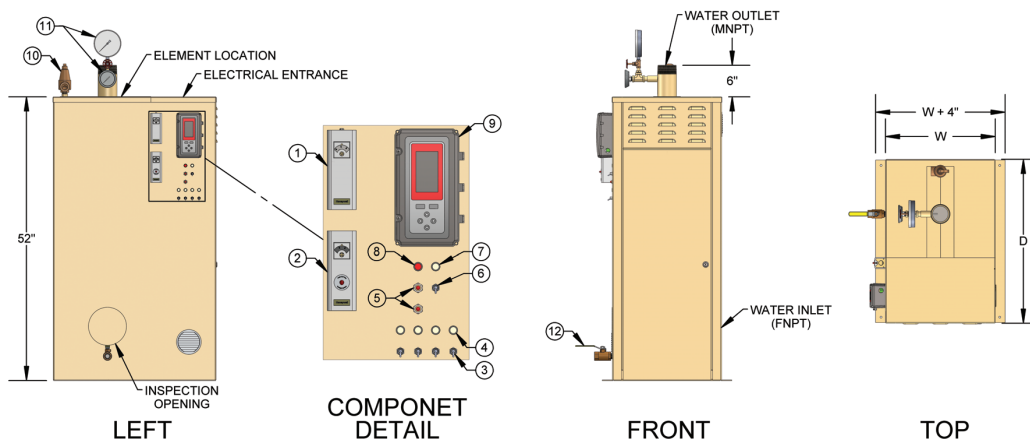
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OPTIONAL EQUIPMENT AND ACCESSORIES

- Non-Fused Disconnect or Non-Auto Breaker
- Fused Disconnect or Automatic Breaker
- Shunt Trip Circuit Interrupter
- Ground Fault Detection System
- Ammeter (1 or 3 phase)
- Voltmeter (1 or 3 phase)
- Watt-hour Meter
- Time Clock (24 hour or 7 day)
- Alarm Buzzer with Silencing Switch
- Safety Door Interlock
- Low Temperature Switch/Alarm
- Remote Reset of Setpoint (to Accomodate BAS Analog Reset Signal)
- Stainless Steel Construction (210°F max) for Deionized water
- Local/Remote Switch to Accomodate BAS Analog Control Signal
- PLC's and Other Interface Provisions (Consult Factory)
- Outdoor Reset Control
- Flow Switch (Installed)
- High/Low Pressure Switches/Alarms
- Auxiliary Low Water Cut-off (Float or Probe type) (Auxillary Probe type standard on units > 117 KW)
- Manual Reset Low Water Cut-off
- Temperature Gauge (3" / Installed)
- 4" Connection Size (PCW3 or PCW4)
- Proportional Step Control (for 3 or 4 Stage Models)
- Linear Sequence Step Control

Contact Factory for Many Other Options to Meet Your Specific Requirements.

DIMENSIONAL DATA



NOTE: MINIMUM CLEARANCE OF 36" IN FRONT OF CONTROL CABINET AND 30" FOR ELEMENT REMOVAL.

COMPONENTS

1. Temperature Limit, Auto Reset
2. Temperature Limit, Manual Reset
3. Manual Limit Switches
4. Pilot Lights, Amber (Steps "ON")
5. PB Switches (Low Water Cutoff "Test" / "Reset")
6. Toggle Switch (Control Power)
7. Pilot Light, Amber (Control Power "ON")
8. Pilot Light, Red (Low Water)
9. Temperature Setpoint / Control / Readout
10. Safety Relief Valve
11. Temperature and Pressure Gauges
12. Drain Valve

PHYSICAL DATA

	PCW 1	PCW 2	PCW 3	PCW 4	PCW 5
Max KW @ 208V*/480V*	120/160	180/240	360/480	NA/600	NA/720
• Dimensions:	52"H x 20"W x 30"D	52"H x 24"W x 34"D	52"H x 28"W x 38"D	52"H x 32"W x 46"D	52"H x 38"W x 48"Dx
• Approx Ship Weight:	600 lbs	800 lbs	1100 lbs	1800 lbs	2300 lbs
• Tank Size (dia/gal):	12"/22	16"/36	20"/56	24"/80	30"/126
• Connection Size:	3" NPT	3" NPT	3" NPT***	3" NPT***	4" NPT
• Max Flow (gpm):	230	230	230***	230***	300
• Drain Size (NPT):	3/4"	1"	1" / 1 1/4"	1 1/4"	1 1/4"

* 3-phase (Note: PCW1 is also available in single phase)

** Height may increase on Model PCW5 depending on bottom head construction

*** 4" FLG connection (300 gpm max) is optional

Actual dimensions depend on options (EG. number of steps, disconnects, etc...)



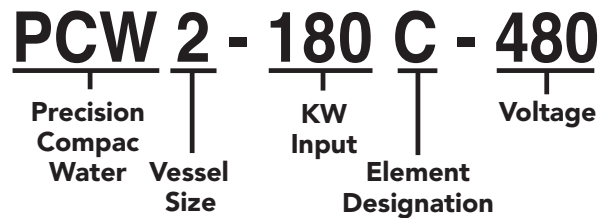
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CONVERSIONS/EQUATIONS

$KW = \frac{GPH \times \Delta T (^{\circ}F)}{410} = \frac{LPH \times \Delta T (^{\circ}C)}{862}$ $KW = GPM \times \Delta T (^{\circ}F) \times .146$ $10KW = 1.02 BHP = 34 \text{ Lbs Steam/H} = 34,120 \text{ BTU/H}$ $GPH = \frac{KW \times 410}{\Delta T (^{\circ}F)} \quad \text{Amps (3 phase)} = \frac{KW \times 1000}{\text{Volts} \times 1.732}$ $GPH = \frac{BTU/H}{8.33 \times \Delta T (^{\circ}F)} \quad \text{Amps (1 phase)} = \frac{KW \times 1000}{\text{Volts}}$ $BTU/H = KW \times 3412 \quad \quad \quad BTU/H = \Delta T \times 500 \times GPM$ $1 \text{ gal water at } 62^{\circ}F = 8.34 \text{ Lbs} \quad \quad 1 \text{ cu ft} = 7.48 \text{ gallons}$ $1 \text{ cu ft water at } 62^{\circ}F = 62.4 \text{ Lbs} \quad \quad 1 \text{ ft water} = 0.435 \text{ psi}$ $\text{Enthalpy of water} = \text{Temp } (^{\circ}F) - 32 \text{ BTU/LB}$	<p align="center">SATURATED STEAM: PRESSURE vs. TEMPERATURE</p> <table border="0"> <tr> <td>0 psig = 0 KPa = 212°F</td> <td>150 psig = 1034 KPa = 366°F</td> </tr> <tr> <td>8 psig = 55 KPa = 235°F</td> <td>175 psig = 1207 KPa = 377°F</td> </tr> <tr> <td>15 psig = 103 KPa = 250°F</td> <td>200 psig = 1379 KPa = 388°F</td> </tr> <tr> <td>30 psig = 207 KPa = 274°F</td> <td>225 psig = 1551 KPa = 397°F</td> </tr> <tr> <td>50 psig = 345 KPa = 298°F</td> <td>250 psig = 1724 KPa = 406°F</td> </tr> <tr> <td>80 psig = 552 KPa = 324°F</td> <td>300 psig = 2068 KPa = 422°F</td> </tr> <tr> <td>100 psig = 690 KPa = 338°F</td> <td>350 psig = 2413 KPa = 436°F</td> </tr> <tr> <td>125 psig = 862 KPa = 353°F</td> <td>400 psig = 2758 KPa = 448°F</td> </tr> </table>	0 psig = 0 KPa = 212°F	150 psig = 1034 KPa = 366°F	8 psig = 55 KPa = 235°F	175 psig = 1207 KPa = 377°F	15 psig = 103 KPa = 250°F	200 psig = 1379 KPa = 388°F	30 psig = 207 KPa = 274°F	225 psig = 1551 KPa = 397°F	50 psig = 345 KPa = 298°F	250 psig = 1724 KPa = 406°F	80 psig = 552 KPa = 324°F	300 psig = 2068 KPa = 422°F	100 psig = 690 KPa = 338°F	350 psig = 2413 KPa = 436°F	125 psig = 862 KPa = 353°F	400 psig = 2758 KPa = 448°F
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HOW TO SELECT A MODEL NUMBER



208 & 240 VOLT RATINGS*

Model Number*	Rating		Elements		Number of:		Amps (208/3)	Model Number*	Rating		Elements		Number of:		Amps (208/3)
	MBH	KW	Qty	KW	Circuits	Steps @ KW			MBH	KW	Qty	KW	Circuits	Steps @ KW	
PCW1-015	51	15	1	15	1	1@15	42	PCW1-135	461	135	9	15	9	1@45,3@30	376
PCW1-020	68	20	2	10	2	1@20	56	PCW2-150	512	150	10	15	10	5@30	417
PCW1-030	102	30	2	15	2	1@30	84	PCW2-165	563	165	11	15	11	1@45,4@30	459
PCW1-040	136	40	4	10	4	2@20	111	PCW2-180	614	180	12	15	12	6@30	501
PCW1-045	154	45	3	15	3	1@15,1@30	125	PCW3-210	717	210	14	15	14	7@30	584
PCW1-060	205	60	4	15	4	2@30	167	PCW3-225	768	225	15	15	15	1@45,6@30	626
PCW1-075	256	75	5	15	5	1@15,2@30	209	PCW3-240	819	240	16	15	16	8@30	668
PCW1-080	273	80	8	10	8	4@20	222	PCW3-270#	921	270	18	15	18	9@30	751
PCW1-090	307	90	6	15	6	3@30	251	PCW3-300#	1024	300	20	15	20	10@30	834
PCW1-105	358	105	7	15	7	1@15,3@30	292	PCW3-330#	1126	330	22	15	22	11@30	918
PCW1-120	409	120	8	15	8	4@30	334	PCW3-360#	1228	360	24	15	24	12@30	1001

*For lower KW ratings, please refer to the Precision "COMPAC" Boiler.

- * For complete model number, suffix boiler KW by element KW letter designation, wherein A=10KW, B=15KW, C=18KW, D=20KW, H=33KW, and voltage (208, 240, or 480 volts). (eg, HCW1-180C-480 indicates 180 KW using 18KW elements @ 480 volts)
- # Oversize control cabinets are supplied for these models at 208 & 240 volts.
- ## These models also available @ 380/415 volts derated by 25%
- † These models have 108 wsi elements.



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480 VOLT RATINGS*

Model Number*	Rating		Elements		Number of:		Amps (480/3)	Model Number*	Rating		Elements		Number of:		Amps (480/3)
	MBH*	KW	Qty	KW	Circuits	Steps @ KW			MBH*	KW	Qty	KW	Circuits	Steps @ KW	
PCW1-015	51	15	1	15	1	1@15	18	PCW2-240	819	240	12	20	6	6@40	289
PCW1-018	61	18	1	18	1	1@18	22	PCW3-240	819	240	16	15	8	8@30	289
PCW1-020	68	20	1	20	1	1@20	24	PCW3-252	860	252	14	18	7	7@36	304
PCW1-030	102	30	2	15	1	1@30	36	PCW3-270#	921	270	15	18	8	1@18,7@36	325
PCW1-036	123	36	2	18	1	1@36	44	PCW3-280	955	280	14	20	7	7@40	337
PCW1-040	136	40	2	20	1	1@40	48	PCW3-288	983	288	16	18	8	8@36	347
PCW1-045	154	45	3	15	2	1@15,1@30	54	PCW3-300#	1024	300	15	20	8	1@20,7@40	361
PCW1-054	184	54	3	18	2	1@18,1@36	65	PCW3-320	1092	320	16	20	8	8@40	385
PCW1-060	205	60	4	15	2	2@30	72	PCW3-330#	1126	330	22	15	11	5@30,3@60	397
PCW1-072	246	72	4	18	2	2@36	87	PCW3-360#	1228	360	20	18	10	6@36,2@72	434
PCW1-075	256	75	5	15	3	1@45,1@30	90	PCW3-400##	1365	400	20	20	10	6@40,2@80	482
PCW1-080	273	80	4	20	2	2@40	96	PCW3-440##	1501	440	22	20	11	5@40,3@80	530
PCW1-090	307	90	5	18	3	1@18,2@36	109	PCW3-480##	1638	480	24	20	12	4@40,4@80	578
PCW1-100	341	100	5	20	3	1@20,2@40	121	PCW4-520##	1774	520	26	20	13	3@40,5@80	626
PCW1-105	358	105	7	15	4	1@45,2@30	126	PCW4-560##	1911	560	28	20	14	2@40,6@80	674
PCW1-108	368	108	6	18	3	3@36	130	PCW4-600##	2047	600	30	20	15	1@40,7@80	723
PCW1-120	409	120	6	20	3	3@40	145	PCW5-640##	2184	640	32	20	16	8@80	771
PCW1-126	430	126	7	18	4	1@18,3@36	152	PCW5-680##	2320	680	34	20	17	1@40,8@80	819
PCW2-135	461	135	9	15	5	1@45,3@30	163	PCW5-720##	2457	720	36	20	18	9@80	867
PCW1-140	478	140	7	20	4	1@20,3@40	169								
PCW1-144	491	144	8	18	4	4@36	173	PCW1-165 †	563	165	5	33	5	5@33	199
PCW2-150	512	150	10	15	5	5@30	181	PCW1-198 †	676	198	6	33	6	6@33	238
PCW1-160	546	160	8	20	4	4@40	193	PCW1-232 †	788	231	7	33	7	7@33	278
PCW2-165	563	165	11	15	6	1@45,4@30	199	PCW1-264 †	901	264	8	33	8	8@33	318
PCW2-180	614	180	10	18	5	5@36	217	PCW2-297 †	1013	297	9	33	9	9@33	358
PCW2-200	682	200	10	20	5	5@40	241	PCW2-330 †	1126	330	10	33	10	10@33	397
PCW3-210	717	210	14	15	7	7@30	253	PCW2-363 †	1239	363	11	33	11	11@33	437
PCW2-216	737	216	12	18	6	6@36	260	PCW2-396 †	1351	396	12	33	12	12@33	477
PCW3-225	768	225	15	15	8	1@45,6@30	271								

*From & At 212°F.

**These models may require 2 power panels (add 12" to "W" dim).

† Models above 1040KW are also available in 40KW increments.

* For complete model number, suffix boiler KW by element KW letter designation, wherein A =10KW, B=15KW, C=18KW, D=20KW, H=33KW, and voltage (208, 240, or 480 volts). (eg, HCW1-180C-480 indicates 180 KW using 18KW elements @ 480 volts)

Oversize control cabinets are supplied for these models at 208 & 240 volts.

These models also available @ 380/415 volts derated by 25%

† These models have 108 wsi elements.

380 & 415 VOLT RATINGS*

Model Number*	Rating		Elements		Number of:		Amps (380/3)	Model Number*	Rating		Elements		Number of:		Amps (380/3)
	MBH*	KW	Qty	KW	Circuits	Steps @ KW			MBH*	KW	Qty	KW	Circuits	Steps @ KW	
PCW1-015	51	15	1	15	1	1@15	23	PCW2-165	563	165	11	15	6	1@45,4@30	251
PCW1-030	102	30	2	15	1	1@30	46	PCW2-180	614	180	12	15	6	6@30	274
PCW1-045	154	45	3	15	2	1@15,1@30	68	PCW3-210	717	210	14	15	7	7@30	320
PCW1-060	205	60	4	15	2	2@30	92	PCW3-225	768	225	15	15	8	1@45,6@30	342
PCW1-075	256	75	5	15	3	1@45,1@30	114	PCW3-240	819	240	16	15	8	8@30	365
PCW1-090	307	90	6	15	3	3@30	137	PCW3-270#	921	270	18	15	9	1@60,7@30	411
PCW1-105	358	105	7	15	4	1@45,2@30	160	PCW3-300#	1024	300	20	15	10	2@60,6@30	456
PCW1-120	409	120	8	15	4	4@30	183	PCW3-330#	1126	330	22	15	11	3@60,5@30	502
PCW2-135	461	135	9	15	5	1@45,3@30	205	PCW3-360#	1228	360	24	15	12	4@60,4@30	548
PCW2-150	512	150	10	15	5	5@30	228								

*From & At 100°C.

**These models may require 2 power panels (add 12" to "W" dim).

† Models above 840KW are also available in 30KW increments.

* For complete model number, suffix boiler KW by element KW letter designation, wherein A =10KW, B=15KW, C=18KW, D=20KW, H=33KW, and voltage (208, 240, or 480 volts). (eg, HCW1-180C-480 indicates 180 KW using 18KW elements @ 480 volts)

Oversize control cabinets are supplied for these models at 208 & 240 volts.

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SPECIFICATIONS

1. GENERAL

Furnish and install as shown on the plans ___ electric hot water boilers, fabricated per these specifications, including all accessories and construction features as described herein. Boilers shall be completely factory assembled and pre-tested prior to shipment. Boilers shall be UL labeled and shall include an ASME Section IV pressure vessel which has been fabricated under inspection by an authorized inspector holding a National Board commission and subsequently stamped and National Board registered. Units greater than 117 KW shall also comply with CSD-1.

2. RATINGS

Boilers shall each be PRECISION Compac Model No. PCW-1,2,3,4 or 5 rated _____ KW, designed and fabricated for a balanced 3-phase, 3-wire, delta load at ___ volts, 3-phase, ___ hertz. The boilers shall be designed for ___ GPM with a discharge temperature of ___°F with entering water at ___°F.

3. PRESSURE VESSEL

The pressure vessel and all trim shall be as set forth in the ASME Code, including ASME "HV" stamped safety relief valve sized as required. The vessel shall be provided with a threaded 3" (4" flanged) inlet and a threaded 3" (4" flanged) outlet, plus safety valve and drain nozzle as required. The pressure vessel shall be housed in a 16-gauge steel enclosure allowing 4 inches of insulation space around the vessel and filled with 4 inches of 3/4 pound-density fiberglass insulation. The electric panel and vessel shall be mounted on a common, structural steel base with overall dimensions of the unit not to exceed ___"D x ___"W x ___"H.

4. INTERNAL POWER DISTRIBUTION

The power distribution shall be through cable connection to mechanical lugs. Power shall be fed through current limiting fuses to magnetic contactors, and then to the heating element circuits. Contactors shall be 3-pole magnetic contactors tested by UL for 500,000 cycles at full load, The coil voltage shall be 120-volts. Internal wiring shall be in accordance with UL & NEC.

5. HEATING ELEMENTS

Elements shall be individually mounted in steel flanges. The flange size shall not exceed 2 1/2 inches square, with a maximum of three single-bend U-shaped element blades per flange. Element sheath material shall be Incoloy.

6. CONTROLS

The control circuit shall be 120-volt single-phase, one side grounded. Control voltage shall be provided by an integral control circuit transformer, fused on both legs of the primary, with a control circuit fuse on the ungrounded leg of the secondary. The controls shall include an ON/OFF switch, a manual limit switch and, indicator lights for each stage of heating, a low water cut-off, and one auto reset and one manual reset high limit temperature switches.

7. MANUFACTURER

Boilers shall be PRECISION Model PCW-1,2,3,4 or 5 or approved equivalent. Alternate bids shall indicate any deviations from these specifications, and shall state price additions or deductions for substitution of said alternates.



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LIMITED WARRANTY

PRECISION warrants all electrical components (except pilot lights and fuses), pressure vessel and heating elements, if found defective in workmanship or material while under normal use and service within the first year of operation or until 18 months after shipment from PRECISION'S factory, whichever occurs first, after authorized return by purchaser to PRECISION (at purchaser's expense) and after examination discloses to PRECISION'S reason-

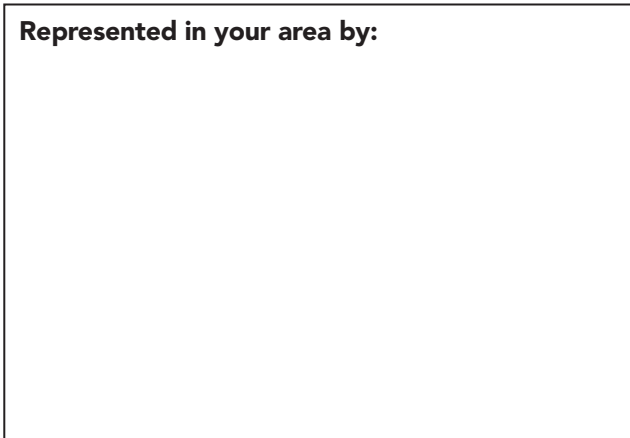
able satisfaction to be defective. The repair or replacement of defective parts will be made by PRECISION without charge. PRECISION will not be held responsible for any field charges in connection with the removal or replacement of allegedly defective parts, nor for incidental or consequential damages. This guarantee does not include damage resulting from unsuitable water.

CONTACT US FOR THESE QUALITY PRODUCTS

- Electric Storage Heaters 125 to 5500 Gallons
- Electrode High Voltage Boilers
- Thermal Storage Systems Space Heating & Domestic or Process Water; Electric, Gas or Steam Fired
- Boiler Feedwater Systems
- Pressure Vessels Water Storage Tanks Flash Tanks Blowdown Tanks
- Unfired Hot Water and Steam Generators
- Deaerators and Surge Tanks
- Steam Superheaters-Electric
- Circulation Heaters-Electric
- Gas or Oil-Fired Vertical Firetube Boilers and Water Heaters
- Gas or Oil-Fired WaterTube Boilers (Flextube Type)
- Chemical Bypass Feeders and Automatic Chemical Feed Systems

NOTE: In pursuing our policy of continuous development of products, PRECISION reserves the right to vary any detail in this bulletin without notice.

Represented in your area by:



Precision Boilers
5727 Superior Drive
Morristown, TN 37814



**PRECISION
BOILERS**

PHONE: (423) 587-9390
FAX: (423) 581-7749
E-mail: sales@precisionboilers.com
WEB: www.precisionboilers.com